THE IRON TRADE REVIEW

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Pig Iron Production Shows Steady Decline,

The Total for the First Half Being the Lowest Six Months' Production Since First Half of 1909—Pig Iron is Dull

Many finishing mills and steel works closed Saturday night and resumed Wednesday morning, but others will not become active for a week or two, and some iron mills will be idle throughout the month. Owing to the improvement in demand for finished material, the July shut-down will not be as extended in many cases as was thought probable a few weeks ago. The rail and billet division of the Carnegie Steel Co. reports mill orders in June were largely in excess of May.

Pig Iron Production

The production of coke and anthracite pig iron steadily declined throughout the first half of the year. The June output was 1,781,406 tons, a loss of 89,982 tons compared with May. The daily average production for June was 59,380 tons, compared with 60,367 tons in May. There was a net loss of four stacks in operation during the month. The production for the first half of the year was 11,411,405 tons, which is 3,342,044 tons less than the first half of last year, and is the smallest half-year output since the first half of 1909, which was 10,820,672 tons. Iron ore shipments in June were 4,826,505 tons, compared with 3,684,319 tons in May of this year, and 7,316,592 tons in June, 1910.

Pig Iron

There seems to be considerable quiet buying of pig iron in eastern territory, but throughout the country inquiries usually represent very much larger tonnages than orders. The General Electric Co. has bought several thousand tons from New York and eastern Pennsylvania makers. A considerable tonnage of basic is pending at Pittsburg and in the east. A Canton, O., steel company has covered for a part of its requirements, buying considerably less than was inquired for from a valley furnace.

Railroad Buying

Inquiries for from 10,000 to 12,000 freight cars are pending. The Erie is in the market for 3,800 cars of various descriptions. The Northern Pacific has ordered 1,000 steel underframes from the Pressed Steel Car Co., and will build the cars in its own works. The Louisville & Nashville has also purchased 1,000 steel underframes. The Cambria Steel Co. will build 200 all-steel hopper cars for the Cambria & Indiana railroad.

Shapes

Developments in regard to the New York subway construction indicate that work may be begun in the early fall, calling for a large tonnage of structural material. The Bamberger store, Newark, N. J., requiring 6,000 tons of structural material, has been awarded to the Bethlehem Steel Co. The Federal Life Insurance Co., Chicago, 1,368 tons, has been awarded to the Worden-Allen Co.

Pipe

The city of Detroit is calling for bids up to July 11 on 11,000 tons of cast iron pipe. Hammond, Ind., has awarded 1,900 tons to the leading interest. A heavy tonnage of line pipe is under negotiation. An independent mill has taken an order for about 600 tons of steel line pipe for shipment to West Virginia, and an eastern mill has booked an order for 17 miles of 6-inch pipe for shipment to the Pure Oil Co., West Virginia.

Sheets

The sheet market in the central west is active, and additional mills will be started this month. Low prices recently made are being occasionally shaded. Specifications against tin plate contracts are heavy. Improvement continues in the semi-finished steel market. Numerous contracts which expire June 30 have been extended to Oct. 1. Most of the mills which closed on the last day of the month will resume the latter part of this week.

Bars

More contracts for steel bars have been made in the east, and some western implement manufacturers have also contracted. The quotation of 1.25c, Pittsburg, is being maintained in the central west, but there are some rumors of 1.20c being done in eastern territory.

Coke

Owing to the blowing out of a number of blast furnaces during the past ten days, a large tonnage of furnace coke for July shipment is being offered at low prices. It is estimated that between 250,000 and 300,000 tons of furnace coke has been sold in the Pittsburg district during the past two weeks for shipment up to the end of the year. On account of the temporary closing of numerous mills, shipments of old material have decreased and the market is dull.

WORLD'S IRON MARKETS

PITTSBURG

Improvement Continues — Merchant Furnaces Blowing Out.

Office of THE IRON TRADE REVIEW,
2148-49 Oliver Bldg., July 3.

The improvement in the local iron and steel trade which began early in June, continues, although the market has been rather quiet during the past week on account of the closing down of a number of steel mills on June 30 for inventory and repairs and the closing of the general offices for the holiday. Owing to the fact that the major portion of the buying in June was for early shipment, it is not likely that the mills will be idle very long. In some instances, finishing mills will resume operations Wednesday morning, although a large percentage of the plants which are undergoing repairs will not be started until the latter part of the week. In practically all lines of finished steel, bookings and specifications in June exceeded those of April and May. The market on sheets is the most active branch of the trade and some companies established a new record for June.

Moderately heavy tonnage of pig iron has changed hands during the past two weeks, and several large inquiries are pending. Prices are low, but the blowing out of a number of merchant furnaces indicates that sellers will be in a position to prevent a further decline in prices. The monthly average prices on basic and Bessemer as announced for June are $13.06, valley, and $15, valley, respectively. The Pressed Steel Car Co. has taken an order for 1,000 steel underframes for the Northern Pacific railroad, and will furnish 500 of the 1,000 steel underframes ordered by the Louisville & Nashville. Pending inquiries for freight cars involve from 10,000 to 12,000 cars.

The blowing out of a large number of blast furnaces has resulted in standard Connellsville furnace coke for prompt shipment being offered at extremely low prices and the indications are that shipments in July will show a big falling off as compared with last month. There is slightly more new business in wire products and some mills have rejected orders for heavy tonnage of plain wire and wire nails for delivery over the remainder of the year at today's prices. Bar iron prices are firmer and sales have been made during the week at 1.30c, Pittsburg. The scrap market is extremely quiet. Prices show no material change. The Pure Oil Co. has placed an order with an eastern mill for 17 miles of 6-inch iron pipe, and a local mill has taken an order for 600 tons of 4 to 8-inch steel line pipe for shipment to West Virginia.

Pig Iron.—Consumers of pig iron are showing more interest in forward requirements and there is more activity in the way of inquiries and sales. Low prices are still being quoted on practically all grades. Sellers, however, believe that prices have reached bottom and the blowing out of a number of merchant furnaces during the last half of June is expected to help the situation materially. More than one-half dozen merchant stacks have been blown out during the week, or will be blown out within the next few days. No. 1 stack of the Shenango Furnace Co., Sharpsville, Pa., was blown out June 30 for relining and enlargement. The furnace now has a capacity of 360 tons and when the improvements are completed will have a capacity of 425 tons. A few additional non-merchant stacks will be blown in about July 10.

The United States Steel Co., Canton, O., has covered for a part of its last quarter requirements of basic and bids have been submitted on other inquiries noted recently. Approximately 25,000 tons of basic is under negotiation. The monthly average price of basic for June as announced from one source is given as $13.06, valley, or $13.96, Pittsburg, as compared with $13.40, valley, or $14.30, Pittsburg, for May. The average for basic was compiled from three or four transactions involving basic which originally figured in exchange deals for scrap, and running contracts, as no important sales of basic have been reported. The general asking price on basic by furnaces is $13.25, valley. A total of about 350 tons of Bessemer has been sold by middlemen at from $14.75 to $14.85, valley, but furnaces will not quote below $15, valley. The monthly average price on Bessemer for June is given as $15, valley, or $15.90, Pittsburg, the same as for the preceding month. Pending inquiries involve about 1,500 tons of this grade. The National Radiator Co., Johnstown, Pa., has bought 3,000 tons of foundry iron for last half shipment. The iron will come from nearby furnaces and the price paid is understood to be $13.50, furnace. There has also been some buying of foundry grades in small lots for early shipment by other interests. We quote the market as follows:

(Prompt Shipment.)

Bessemer, valley	$15.00
Bessemer, Pittsburg	15.90
Basic, valley	13.25
Basic, Pittsburg	14.15
No. 2 foundry, Pittsburg	14.40
Gray forge, Pittsburg	13.90
Malleable, Pittsburg	14.15

(Third Quarter.)

Bessemer, valley	$15.00
Bessemer, Pittsburg	15.90
Basic, valley	13.25
Basic, Pittsburg	14.15
No. 2 foundry, Pittsburg	14.40
Gray forge, Pittsburg	13.90
Malleable, Pittsburg	14.15

Ferro-Alloys.—Most consumers of ferro-manganese and 50 per cent ferro-silicon are covered for early needs and trading is extremely light. Prices are not very firm.

We quote ferro-manganese at $36.50 to $36.75, Baltimore, for prompt and forward delivery. The freight rate from Baltimore to Pittsburg is $1.95 per ton.

Fifty per cent ferro-silicon is quoted at $52.75 to $53.75, Pittsburg, for prompt and forward delivery; 12 per cent, $25; 11 per cent, $24; 10 per cent, $23, f. o. b. Jisco and Ashland furnaces. The freight rate to Pittsburg is $1.90. The foreign grades are held at $1 or more a ton over domestic prices.

Plates.—Several companies in this territory made a very creditable showing in new business and specifications against contracts for plates in June. In addition to the business already placed, moderately heavy tonnage is under active negotiation and several fairly large awards will in all probability be made within the next week. Inquiries for approximately 10,000 to 12,000 freight cars are pending. Some of the initial lines report a shortage of box cars and will be obliged to enter the market in the near future. The Pressed Steel Car Co. has taken an order for 1,000 steel underframes for the Northern Pacific railroad. The

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Louisville & Nashville railroad has awarded contracts for 1,000 steel underframes, 500 of which will be furnished by the Pressed Steel Car Co. The Erie railroad is in the market for approximately 4,000 and the Illinois Central railroad is understood to be in the market for 2,000 freight cars. The Cambria Steel Co. will build 200 all-steel hopper cars for the Cambria & Indiana railroad. We quote the market as follows:

Tank plates, ¼ inch thick, 6¼ to 100 inches, 1.35c. Extras are as follows, per 100 pounds: Boiler and flange steel plates, 0.10c; A. B. M. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.20c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end being not less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ¼ inch to and including 3-16 inch plate on thin edge, 0.10c; under 3-16 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms net cash in 30 days.

Sheets.—This market is the most active branch of the iron and steel trade at present, some companies having established a new record this year in bookings for the month of June. On account of the heavy shipments last month, manufacturers' stocks have decreased materially and additional mills will be started before July 15. Practically all sheet mills were closed June 30. Some of these mills will be started Wednesday morning, while others will remain idle throughout the week for repairs. Despite the fact that prices on sheets were recently reduced $4 a ton, one or two small mills have offered price concessions during the week. We quote the market as follows, with $1 a ton added as the delivered price in the Pittsburg district:

Blue annealed sheets No. 10 gage 1.50c; black annealed sheets No. 28 gage 2c; galvanized sheets No. 28 gage 3c; painted roofing sheets 1.40c per square for No. 28 gage, 2½-inch corrugation; galvanized roofing sheets 2.55c per square for No. 28 gage, 2½-inch corrugation, f. o. b. Pittsburg.

Tin Plate.—Specifications against contracts for tin plate during the past 15 days have been very heavy for this season of the year. Most of the larger users have covered for their requirements over the next six months and trading at present is light. Most of the tin mills are idle this week, but likely will resume about July 10. Some of the independents will operate full time beginning with that date. We quote the market as follows:

Coke tin plate, 100-pound basis, 14 x 20, $3.70 f. o. b. mill, Pittsburg district.

Rails and Track Material.—Liberal specifications have been received against contracts for standard steel rails and some of the railroads have taken practically all of the tonnage involved in the contracts placed during the early part of the year. Rail mills in this section are operating to greater capacity than for several months. In addition to the moderately heavy buying during the past month, it is stated that a number of the trunk lines will place orders in the near future for considerable tonnage for delivery over the remainder of the year. Three or four roads have bought a large quantity of railroad spikes during the past two weeks, one company having booked upward of 5,000 kegs. Prices are somewhat firmer and one or two mills will not quote below $1.60, Pittsburg. We quote the market as follows, the base price on open-hearth rails being 1.34c per pound at the mill:

Fifty-pound and heavier, 1.25c per pound; carloads and less than 500 tons, 1.34c per pound; light rails on base weight of 40 to 45 pounds, 1.16c, the schedule on the other weights being irregular and subject to negotiations; angle splice bars for standard sections, 1.50c, Pittsburg; track bolts, 2.25c, Pittsburg.

RAILROAD SPIKES.

4½, 5 and 5½ x 9/16	$1.55 to $1.60
3, 3½, 4, 4½ and 5 x ½	.10
3½, 4 and 4½ x 7/16	.20
3, 3½, 4 and 4½ x 5/8	.30
2½ x 3/8	.40
2½ 2½, 3 and 3½ x 7/16	.60
2 x 9/16	.80

Steel.—The improvement in the semi-finished steel market, noted recently, continues. Most of the contracts which expired June 30 have been extended to Oct. 1, and specifications in June exceeded those of any preceding month this year, with the exception of March. One or two large buyers, who have not yet covered for third quarter, are offering heavy tonnage for early shipment, but are not inclined to pay the prices asked by sellers. However, no business has been placed below the regular, openly quoted prices and in a few instances premiums have been paid on small lots of forging steel for early shipment. Most of the mills which closed June 30 will resume operation the latter part of the week. We quote the market as follows:

Bessemer 4 x 4 billets with 0.25 carbon and less are quoted at $21, with the usual extras for size and analysis, and open-hearth rolling billets, $21. Bessemer sheet and tin bars are quoted at $22, and open-hearth sheet bars are quoted at $22, f. o. b. Pittsburg or Youngstown, with full freight to destination added. Forging billets are quoted at $26, Pittsburg.

Hoops and Bands.—New business in hoops and bands is only moderately heavy, although specifications show a slight improvement. We quote the market as follows:

Hoops in carload lots, 1.40c, Pittsburg; in less than carload lots, 1.50c; bands, 1.25c base, with net extras, as per standard steel.

Merchant Bars.—Additional contracts for steel bars were placed during the week, although a large portion of the agricultural business is still being held up. One or two local companies have extremely heavy tonnage of steel bars on their books, while others are showing only a moderate gain, as compared with the early part of June. Beginning about July 10, it is expected that the steel bar mills will be operating to greater capacity than for some time. The bar iron market continues quiet. Practically all companies in the immediate Pittsburg district are now quoting 1.30c, Pittsburg, for bar iron and some sales have been made at this figure. During the past three months, bar iron has sold below steel bars, but at the present time is held at $1 a ton above steel bars. A number of bar mills which were closed June 30, will be idle the greater part of this week. Demand for shafting is fair. We quote the market as follows:

Common iron bars, 1.30c, Pittsburg; Bessemer and open-hearth steel bars, 1.25c; plow and cultivator, 1.25c; channels, angles, zees, tees, under 3-inch, 1.35c, all f. o. b. mill. The following differentials are maintained on steel: Less than 2,000 pounds of a size, 0.35c advance. Cold rolled and ground shafting, 60 per cent off in carloads and 55 per cent in less than carloads, delivered in base territory.

Muck Bar.—One or two small inquiries for muck bar have appeared, but no important sales have been made for some months. We continue to quote the best grades of muck bar nominally at $29, Pittsburg.

Structural.—Heavy tonnage of structural steel is under negotiation and the indications are that several fairly large awards, which have been pending for some time, will be made before the end of the week. Bids for the proposed new bridge across the Ohio river, at Pittsburg, involving 9,000 tons of steel, have not been put out as yet, but probably will be before the end of the week. On account of the greater activity in this market, some fabricators are not making as low quotations as a month ago, and practically all shops are operating on a more satisfactory schedule. We quote the market as follows:

Beams and channels, 15 inches and under, 1.35c; over 15 inches, 1.45c; zees, 1.35c; tees, 1.40c; angles, from 3 to 6 inches, 1.35c; over 6 inches, 1.45c; universal and sheared plates, 6¼ inches wide and wider, 1.35c.

Merchant Pipe.—Heavy tonnages of line pipe are under active negotiation, but no especially large orders have been placed in this territory. An independent mill has taken an order for about 600 tons of from 4 to 8-inch steel line pipe for shipment to West Virginia and an eastern mill has taken an order for 17 miles of 6-inch iron pipe for ship-

ment to the Pure Oil Co., West Virginia. In addition to the inquiries noted recently, which are still pending, Smith, Neeley & Co., Muncie, Ind., are understood to be taking bids on 8 and 10-inch line pipe for a new line from Ashland county, O., to Lima, O. Specifications against contracts for merchant pipe are only fair. Several contracts with jobbers have been extended to cover the next few months. We quote the following official discounts in carload lots, subject to the usual preferential discount to the larger buyers, merchant pipe, where specified, being offered in from ⅛ to 6 inches:

Iron and Steel Pipe Basing Prices.

	Steel.		Iron.	
	Butt weld.			
	Black.	Galv.	Black.	Galv.
⅛, ¼, ⅜ inch.....	72	58	68	54
½ inch	75	63	71	59
¾ to 1¼ inch.....	79	69	75	65
2 to 3 inches	80	70	76	66
	Lap weld.			
2 inches	76	66	72	62
2½ to 4 inches	78	68	74	64
4½ to 6 inches.....	77	67	73	63
7 to 12 inches.....	75	59	71	55
EXTRA STRONG, PLAIN ENDS.				
	Butt weld.			
⅛, ¼, ⅜ inch	69	59	65	55
½ inch	74	68	70	64
¾ to 1¼ inch	78	72	74	68
2 to 3 inches.....	79	73	75	69
EXTRA STRONG, PLAIN ENDS.				
	Lap weld.			
2 inches	75	69	71	65
2½ to 4 inches.....	77	71	73	67
4½ to 6 inches.....	76	70	72	66
7 to 8 inches.....	69	59	65	55
9 to 12 inches.....	64	54	60	50
DOUBLE EXTRA STRONG, PLAIN ENDS.				
	Butt weld.			
½ inch	64	58	60	54
¾ to 1½ inch.....	67	61	63	57
2 to 3 inches	69	63	65	59
DOUBLE EXTRA STRONG, PLAIN ENDS.				
	Lap weld.			
2 inches	65	59	61	55
2½ to 4 inches.....	67	61	63	57
4½ to 6 inches.....	66	60	62	56
7 to 8 inches	59	49	55	45

Plugged and reamed pipe is furnished at 2 points higher price, either butt or lap weld.

Boiler Tubes.—Several contracts for merchant and locomotive boiler tubes, which expired June 30, have been extended to cover the third quarter. Shipments against running contracts are light and considerable irregularity in prices is noted. We quote the following official discounts on steel boiler tubes in carload lots to jobbers:

1¾ to 2¼ inch.....	65
2½ inch	67½
2¾ to 3¼ inch	70
3½ to 4½ inch.....	72½
5 and 6 inch	65
7 to 13 inch	62½

To destination east of the Mississippi river will be sold at delivered discount for carloads lowered by 2 points, for lengths 22 feet and under; longer lengths, f. o. b. Pittsburg. Usual extras to jobbers and boiler manufacturers.

Wire Products. — Specifications against contracts for wire products, which have been readjusted to the new basis established by the recent reduction of $2 a ton, are slightly heavier than a month ago and some companies report more inquiry. One or two mills in this territory are limiting new contracts to 60 days and have rejected moderately heavy tonnage at today's prices for delivery over the year. However, there is not as much activity in the wire market as in some other branches of the trade. New demand for cut nails is light. Western manufacturers continue to quote $1.60, Pittsburg, although this price is understood to have been shaded. We quote the market as follows:

Wire nails, jobbers' carload lots, $1.80; retailers' carload lots, $1.85; cut nails (western makers), jobbers' carload lots, $1.60; painted barb wire, jobbers' carload lots, $1.80; retailers' carload lots, $1.90, with 30c for galvanizing; plain wire to jobbers in carloads, $1.60, and to dealers, in carloads, $1.65; polished staples, $1.80; galvanized staples, $2.10.

Wire Rods.—New demand for wire rods is extremely light, users being covered by contracts which have been extended to cover the third quarter at the new quotation of $27, Pittsburg, announced recently. We quote, $27, Pittsburg, on Bessemer and open-hearth wire rods.

Coke.—The blowing out of a number of blast furnaces during the past 10 days has resulted in a large amount of furnace coke for July shipment being offered at low prices. In some instances, it is stated that standard Connellsville furnace coke for prompt shipment has been offered as low at $1.35, ovens. Practically all furnaces are covered for July and August requirements and in two or three cases, at least, low price coke has been offered by furnaces which originally intended to operate throughout July. It is estimated that between 250,000 and 300,000 tons of furnace coke has been sold in this territory during the past two weeks for shipment up to Jan. 1, 1912. Some of the larger consumers, however, are covered only to September. Some foundry coke has been contracted for, but several consumers in the Pittsburg territory have not yet acted upon inquiries noted recently. The indications are that shipments of both furnace and foundry coke in July will be extremely light. We quote standard Connellsville furnace coke for prompt shipment at from $1.35 to $1.50, ovens, and for forward delivery at from $1.50 to $1.70, ovens. On high grade Connellsville foundry coke we quote from $1.80 to $1.90, ovens, for prompt shipment, and from $2 to $2.40, ovens, for forward delivery.

The Connellsville *Courier's* figures for the week ending June 24 show 23,616 active ovens with an output of 273,422 tons, as compared with 23,604 active ovens and a production of 271,088 tons the previous week.

Old Material.—Owing to the closing of a number of mills on June 30, shipments of old material have fallen off considerably. With the exception of a few of the larger buyers, consumers are not disposed to cover for forward requirements, while on the other hand dealers have not been able to pick up a great deal of tonnage at today's prices. Some dealers will not sell heavy melting steel below $13, delivered, Pittsburg, although odd lots have been picked up at $12.75, delivered, Pittsburg. The usual monthly scrap lists of the initial railroads will be put out this week and will involve heavy tonnage. We quote, gross tons, delivered in the Pittsburg district, including Monessen, Sharon, Steubenville, Brackenridge and Follansbee as follows:

Heavy melting scrap	$12.75 to 13.00
Rerolling rails	13.50 to 14.00
Bundled sheet scrap	11.00 to 11.50
Iron axles	23.50 to 24.00
Old iron rails	15.50 to 16.00
Stove plate	10.50 to 10.75
No. 1 wrought scrap.....	13.50 to 14.00
Old car wheels	12.75 to 13.00
Low phosphorus	16.50 to 17.00
Machine shop turnings.....	9.00 to 9.25
Cast borings	8.75 to 9.00
No. 1 cast scrap	13.00 to 13.50
Malleable	13.00 to 13.50

CHICAGO

Business in Finished Lines Progresses —Pig Iron Tends Upward.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Block, July 3.

The iron and steel market in the west enters the second half of the year with a more promising outlook than that which confronted it on the first day of January. A number of large questions which have affected the whole country, such as the railway freight rate controversy and the suits against the Standard Oil Co. and the American Tobacco Co. under the Sherman anti-trust act, have been settled, at least for the time being. In spite of the extraordinarily warm weather during the latter part of June, the crop prospects in the west are unusually good. Business in finished lines of iron and steel is showing moderate but steady progress, and there have been no setbacks since the present revival started. The local mills rolling both iron and steel will shut down during the first few days in July for annual repairs and on account of the holiday, but will be idle a much shorter time than was expected a month ago. Structural contracts reported let in this market last week

will require 3,845 tons of shapes. This includes the Federal Life building, Chicago, 1,368 tons, let to the Worden-Allen Co.

Pig Iron.—The market is apparently on the upgrade as far as tonnage sold and volume of inquiry is concerned, although prices remain practically without buoyancy, due to the large amounts of iron on hand and to the still evident caution of buyers. A manufacturer of agricultural implements at La Porte, Ind., has bought 1,000 tons of southern foundry iron, 2.00 to 2.50 per cent silicon and 0.05 per cent and under sulphur, for delivery over the last quarter at $10, Birmingham. A Chicago malleable foundry has placed an order for 500 tons of malleable at the market price. There is considerable inquiry for malleable for delivery over the first half of next year. A local manufacturer of special machinery has purchased 1,500 tons of Jackson county iron, 10 per cent silicon, at $19.40, Chicago. A foundry in the Chicago district has purchased 1,000 tons of southern No. 2 for delivery over the year at $10.25, Birmingham. A sale of 200 tons of analysis iron to a local foundry is noted. Inquiry is heavy and well scattered. Southern iron grading No. 2 can be purchased for $14.35, Chicago, for immediate shipment, but the best price for extended delivery is $14.60, Chicago, equivalent to $10.25, Birmingham. Conditions in the charcoal iron market are irregular, although little No. 1 Lake Superior charcoal is being sold under $17, Chicago.

The following prices represent the market for Chicago delivery, except northern foundry No. 2 and malleable Bessemer made in local furnaces, which is quoted f. o. b. furnace:

(Shipment this year.)

Lake Superior charcoal	$17.00
Northern foundry No. 2	15.00
Southern foundry No. 2	14.60
Southern silveries, 5 per cent silicon	16.35
Jackson Co. silveries, 8 per cent	18.40
Malleable Bessemer	15.00
Alabama basic	14.60

Billets.—The leading interest is maintaining its price of $28.60, Chicago, for open-hearth forging billets, although independent makers are willing to sell for less. Very little tonnage is moving.

We quote, open-hearth forging billets $27.50, f. o. b. Chicago, and open-hearth, re-rolling billets, $23.60.

Merchant Bars.—Most of the iron bar mills in this territory shut down Friday night, although some ran Saturday and they plan to resume operations between July 7 and 12. The summer shut-down will, therefore, be shorter than usual and considerably shorter than was expected a month ago. Some iron mills in this territory have been operating practically at capacity since June 20, and these will resume as soon after the July 4 holiday as possible. The market for bar iron is broadening, although on account of the large productive capacity of this district, prices have shown no stiffness up to date. Very little demand is noted for hard steel bars, which are still quoted at 1.22½c, Chicago.

Heavy steel bar contracts have been placed by western agricultural implement makers during the past 10 days, and particularly during the past week. A prominent independent interest closely identified with this trade reports that 75 per cent of its usual tonnage has been taken out. The Corporation has also closed a large number of steel bar contracts. The price is firm at 1.25c, Pittsburg. While accurate figures are not available, it is conservatively estimated that 60,000 tons of the 90,000 tons of steel bars usually purchased by implement makers in the Moline territory have been ordered.

We quote, Chicago delivery, as follows:

Bar iron, 1.20c to 1.25c; hard steel bars, rerolled, 1.22½c to 1.30c; soft steel bars and bands and small shapes, 1.43c to 1.48c, base; hoops, 1.63c to 1.68c; smooth finished machinery steel, 1 inch and larger, 1.83c. Shafting 60 per cent off list for carload lots, 55 per cent off for less.

On iron and steel from local stock, we quote, as follows:

Bar iron, 1.80c to 1.90c per pound base; soft steel bars, 1.65c to 1.75c per pound base; soft steel hoops, 1.80c to 1.90c, full extras.

Structural Material.—The Chicago mills rolled a much heavier tonnage of plates and shapes during June than in May. Fabricating contracts are increasing in volume and 3,845 tons of structural material will be required for those reported let in this market last week. The Federal Life Insurance Co., Chicago, has let a fabricating contract for its new building in this city, 1,368 tons, to the Worden-Allen Co. The Corn Products Refining Co., which is making some additions to its plant at Argo, Ill., will build some reinforced concrete buildings in which the steel requirements are 1,065 tons. A contract for a new machine shop for the Great Northern Railway at Hillyard, a suburb of Spokane, Wash., 436 tons, has been let to local interests. The following contracts have been let to the American Bridge Co: Vermilion county court house, Danville, Ill., 194 tons; Cox ferry bridge, Merced county, Cal., 140 tons; E. J. & E. Railway Co., steel work for Charlesworth avenue subway, East Joliet, Ill., 191 tons, and an addition to the Wolvin building, Duluth, Minn., 129 tons. The McClintic-Marshall Construction Co. has taken 129 tons for a clay storage building for Gladding, McBean & Co., San Francisco. The Palm Iron Works, Sacramento, Cal., has been awarded 193 tons for the bank of D. O. Mills, San Francisco.

We quote, structural material, f. o. b. Chicago, as follows:

Beams and channels, 15 inches and under, 1.53c. For extras, see Pittsburg report.

Plain material out of store, is as follows:

All angles, 3 inches and larger, including 6 inches, $1.75 to $1.85 per 100 pounds; angles over 6 inches, $1.85 to $1.90 per 100 pounds, base; beams, 3 to 15 inches, inclusive, $1.75 per 100 pounds, base; channels, 3 inches and larger, $1.75 per 100 pounds, base.

Rails and Track Supplies.—New business in rails is coming in very satisfactorily and the leading interest booked over 40,000 tons last week, including one lot of 30,000 tons for shipment into Canada. The rail mills at Gary and South Chicago will be well filled with business during July. Prices on track supplies are steady and the volume of business is encouraging.

We quote, light rails, f. o. b. Chicago, and track supplies, f. o. b. Joliet, as follows:

Light rails, carloads, 40 to 45-pound, 1.16c to 1.20½c; 30 to 35-pound, 1.19½c to 1.24c; 16, 20 and 25-pound, 1.20½c to 1.25c; 12-pound, 1.25c to 1.29½c.

Light section relayers, 45 pounds and under, subject to inspection, $21 to $23; standard section relaying rails, subject to inspection, $23.50 to $24.

Track supplies, f. o. b. Joliet, angle bars, 1.50c to 1.60c; railroad spikes, 1.65c to 1.75c; smaller size spikes, 1.70c, base; track bolts with square nuts, 2.10c to 2.20c, base.

Plates.—The Chicago plate mills made a much more enviable showing during June than in the preceding month. During the month, the new 60-inch universal plate mill at Gary was completed. This mill, which has an annual capacity of 240,000 tons, will increase the present annual capacity of the universal plate mills in the Chicago district by 137 per cent. In addition to the 500 steel underframes for box cars, reported last week, the Northern Pacific has ordered 500 additional underframes for gondola cars from the Pressed Steel Car Co. Both the box cars and gondolas will be built in the Northern Pacific's own shops. It is possible that a part of the Erie railroad's inquiry for 3,860 cars will be awarded to western interests. The market is generally firm, although there is occasional shading on narrow plates amounting to less than $1 a ton.

We quote, mill prices, f. o. b. Chicago, as follows:

Tank plates, ¼ inch thick, 6¼ to 100 inches wide, 1.53c. For extras, see Pittsburg report.

Store prices are as follows:

Tank steel, ¼ inch and heavier, up to 72 inches wide, 1.75c to 1.85c.

Sheets.—The market is in a healthy condition and both jobbers and manufacturers are ordering freely. The local sheet mill was closed from July 1 to 5. The Chicago market made a better showing during June than any single month for more than a year. Prices are being well maintained.

For mill prices, see Pittsburg report. Freight to Chicago, 18 cents.

We quote, store prices, f. o. b. Chicago, as follows:

Blue annealed, No. 10, 2c; No. 12, 2.05c. Box annealed, No. 28, 2.65c. Galvanized, No. 28, 3.55c.

Wire Products.—A fair amount of business has been booked during the past week, although the volume of wire nail orders is still somewhat unsatisfactory. The smoothing out of labor troubles in Chicago will have a good effect on the local demand. Wire makers are looking forward toward an extremely heavy fall business. Recent government indictments are not having any effect in the trade.

We quote, f. o. b. Chicago, as follows:

Wire nails, jobbers' carload lots, $1.88; retailers' carload lots, $1.93; retailers' less than carload lots, $2.03; painted barb wire, jobbers' carload lots, $1.88; retailers' carload lots, $1.93; retailers', less than carload lots, $2.03, with 30c for galvanizing; plain wire to jobbers, $1.68; plain wire, retailers' carload lots, $1.73; staples, bright, $1.88.

Merchant Pipe and Tubes.—The clearing up of labor troubles in the Chicago district, including a settlement of the jurisdictional strike of the machinists and elevator constructors, is having a good effect on the local market for merchant pipe, which is expanding, although no particularly large awards have been placed recently. The demand for boiler tubes out of store remains moderate and mill orders for this material are fair.

We quote, merchant pipe and tubes, out of store, as follows:

Iron and Steel Pipe Basing Prices.

	Steel. Black.	Steel. Galv.	Iron. Black.	Iron. Galv.
⅛-⅜ inch	69.2	54.2	63.2	48.2
½ inch	72.2	59.2	66.2	53.2
2 in. to 3 in.	77.2	66.2	72.2	61.2
4½-6 inches	74.2	63.2	69.2	58.2
7-12 inches	71.2	54.2	67.2	50.2
Extra Strong Plain Ends.				
⅛ inch	70.2	63.2	54.2	52.2
2-3 inches	75.2	68.2	61.2	55.2
7-8 inches	65.2	....	59.2	47.2
Double Extra Strong.				
⅛ inch	58.2	50.2	....	....
2-3 inches	63.2	55.2	....	....
7-8 inches	53.2	41.2	....	....

Tubes.

	Lap weld steel. Per cent.	Charcoal iron. Per cent.	Shelby seamless. Per cent.
1 inch	39	..	57½
1¼ to 2¼ inch	55	40	35
2¾ to 3¼ inch	62½	50	46

Cast Iron Pipe.—The United States Cast Iron Pipe & Foundry Co. was formally awarded 1,900 tons of 16 and 36-inch water pipe at Hammond, Ind. A contract for 600 tons of water pipe has been let to a local contractor at Mandan, N. D. The largest pipe letting in prospect at the present time is at Detroit, where bids on 10,920 tons will be opened on July 11. Local foundries are making an effort to get a large share of this business.

We quote, f. o. b. Chicago, as follows:

Four-inch water pipe, $25.25; 6 to 12 inches, $24.50, larger sizes, $24; gas pipe, $1 a ton higher.

Old Material.—Although some bar iron mills are enjoying better business, on account of the large amount of stock which they have been carrying, they have not entered the market for additional tonnages of scrap. At present the dealers are inclined to be decidedly optimistic and are talking strongly of higher prices, although consumers are very reluctant to admit that advanced quotations are near. It is pointed out that the stocks of old material on hand in the yards of consumers, dealers, or held by railroads, are very large and until these are worked off little buoyancy can be expected in the local market. The St. Louis & San Francisco railroad opened bids on June 5 on 1,115 tons of miscellaneous grades of old material, including 250 tons of No. 1 railroad wrought. Prices show practically no change since early last week.

We quote the market, for delivery in consumers' yards, as follows:

GROSS TONS.

Old car wheels	$12.75 to 13.25
Old iron rails	14.50 to 15.00
Rerolling rails (5 ft. and over)	12.25 to 12.75
Old steel rails (3 ft. and under)	11.25 to 11.75
Frogs, switches and guards	10.25 to 10.75
Heavy melting steel	10.25 to 10.75
Shoveling steel	9.90 to 10.40

NET TONS.

No. 1 R. R. wrought	$11.00 to 11.50
No. 2 R. R. wrought	10.00 to 10.50
Arch bars and transoms	13.50 to 14.00
Knuckles, couplers and springs	10.00 to 10.50
Shafting	15.00 to 15.50
Iron car axles	17.75 to 18.25
Steel car axles	16.00 to 16.50
Locomotive tires	16.00 to 17.00
Dealers' forge	10.00 to 11.00
Pipes and flues	8.00 to 8.50
No. 1 cast	10.75 to 11.25
No. 1 busheling	8.75 to 9.25
No. 2 busheling	6.75 to 7.25
No. 1 boiler cut	7.50 to 8.00
Boiler punchings	12.50 to 13.00
Cast and mixed borings	5.25 to 5.75
Machine shop turnings	6.25 to 6.75
Railroad malleable	10.00 to 10.50

The Wellston Steel & Iron Co., Wellston, O., blew out its Milton stack on June 23.

CLEVELAND

Iron Ore Movement Shows Increase Compared With Last Month.

Office of THE IRON TRADE REVIEW, Penton Building, July 3.

Ore shipments during June were 4,826,505 gross tons as against 7,316,592 gross tons for June 1910, showing a decrease of 2,490,087 gross tons. The movement to July 1 is 8,842,908 gross tons as against 14,918,258 gross tons to July 1, 1910, a decrease of 6,075,350 tons. During May of the present year, the fleet moved 3,684,819 gross tons, so that the June movement shows the respectable increase of 1,141,686 tons. It is expected that a somewhat better showing will be made during July.

Lake conditions are showing some little improvement and vessel owners are hoping for better things during the last half of the year. A few more vessels are going into commission every week and as the iron trade is undergoing a little change for the better, vessel owners expect that its improved condition will be reflected in lake trade before long.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.50; Mesabi Bessemer, $4.25; old range non-Bessemer, $3.70; Mesabi non-Bessemer, $3.50.

Pig Iron.—There is improved inquiry for delivery outside of the immediate Cleveland district, but within the district extreme quiet prevails. A Canton company bought part of its fourth quarter requirements in basic from a rolling company, but at a low price. Prices are unchanged. We quote, delivered in Cleveland, as follows, for the remainder of the year:

No. 1 foundry	$14.50
No. 2 foundry	14.25
No. 2 southern	14.35
Gray forge	13.25
Bessemer	15.90
Lake Superior charcoal	17.50
Jackson Co. 8 per cent silvery	18.00

Coke.—The moderate improvement in foundry grades noted last week has not been sustained, and the market is very dull. We quote:

Connellsville furnace coke, $1.40 to $1.50 for prompt delivery, and $1.60 to $1.80 for second half, Connellsville foundry coke, $1.80 to $2 for prompt, and $2.15 to $2.35 for second half.

Finished Material.—Demand is fair, and specifications are coming in freely. Negotiations for a number of wire contracts are pending, but only one is reported closed. Bids will be received until July 18 for the steel required for the new city hall, between 3,000

and 4,000 tons. Bids for the east side market place, which will require from 375 to 400 tons of steel, are being received. Numerous sales of small quantities of structural material have been made. Sheet prices are firm, and a very good amount of business is being done. The iron mills are idle, and will probably not resume this month, with the exception of the Union rolling mill, which will be active for a few days cleaning up on some old orders. There is some shading of quotations on shafting.

Old Material.—More of a movement in heavy melting steel locally is noted, one consumer having covered for several thousand tons for delivery over the next few months. Another consumer has put out a tentative inquiry. Consumers outside the city do not appear interested keenly, although the price would appear attractive. Local rolling mills are not buying, but the usual summer shut-down is expected to be curtailed somewhat. We quote, gross tons, f. o. b. Cleveland, as follows:

Old iron rails	$14.00 to 15.00
Old steel rails (under 6 ft.)	12.00 to 13.00
Old steel rails (over 6 ft.)	11.75 to 12.25
Relaying rails	18.00 to 19.00
Old car wheels	12.00 to 12.50
Old steel boiler plate	9.00 to 9.50
Malleable iron (railroad)	11.75 to 12.00
Steel axles	19.00 to 19.50
Axle turnings	8.00 to 8.50
Malleable iron (agricultural)	11.00 to 11.50
Heavy steel	11.50 to 12.00
Country mixed steel	9.00 to 9.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$12.00 to 12.50
No. 1 busheling	10.00 to 10.50
No. 1 machine cast	11.00 to 11.50
No. 1 dealers' wrought	10.50 to 11.00
Machine shop turnings	6.00 to 6.50
Pipes and flues	8.00 to 8.50
Wrought drillings	6.50 to 7.00
Stove plate	9.00 to 9.50

CINCINNATI

Pig Iron Dull and Prices Uncertain—Some Railroad Buying.

Office of THE IRON TRADE REVIEW, 808 Provident Bank Bldg., July 3.

Pig Iron.—With but five of the 16 furnaces in southern Ohio in operation, the northern iron situation is dull and quiet, with prices somewhat uncertain and a large range showing in prices. Southern iron remains unchanged with a $10 price common for the year. The activity for the past week has been confined to sales of malleable and analysis iron in small lots. The large inquiries of basic for a southern Ohio melter, southern iron and gray forge for a Louisville interest and a part of the previous inquiry from southern Michigan are still open. Two inquiries are pending from southern Michigan, one for from 1,000 to 1,500 tons and one for 1,500 to 2,000 tons, both southern iron. A tentative inquiry is out from Illinois for a fair tonnage of southern iron. An inquiry for 300 to 500 tons is out from a southern Indiana stove maker for southern iron for last quarter of this year. A tonnage of 8 per cent silicon iron has been sold in southern Indiana at about $15.75, furnace, which is a new low figure for that grade. The Norfolk & Western and Pennsylvania railroads have closed for their requirements for the last half and next quarter, respectively, the Norfolk & Western taking about 3,000 tons of several grades of iron including both northern and southern charcoal iron in round lots. A local melter took 500 tons of foundry for last half delivery. The Armour Steel Co., of Chicago, will in the near future open the plant of the old Steel Foundry Co., at Winton place, Cincinnati, and will need some low phosphorus and other iron for the manufacture of steel castings. Based on a freight rate of $3.25 from Birmingham and $1.20 from Ironton, we quote Cincinnati and southern Ohio as follows:

Southern foundry No. 2	$13.25
Southern foundry No. 3	12.75
Southern foundry No. 4	12.50
Southern gray forge	12.25
Mottled	12.25
Southern No. 1 soft	13.75
Southern No. 2 soft	13.25
Standard southern car wheel	25.50
Northern No. 2 foundry	14.45
Northern No. 3 foundry	13.95
Northern No. 4 foundry	13.45
Jackson county 8 per cent silicon	16.95

Coke.—Both furnace and foundry coke are somewhat firmer, particularly in the making of new contracts, which are holding up well. Connellsville furnace is considerably stronger and is generally quotable at $1.50 to $1.65 for prompt shipment with $1.65 to $1.75 for second half and year contracts. New River foundry ranges from $2.50 to $3.15 for prompt shipment up to $2.60 and $3.25 for future shipment, with the majority of sales at about $3. A number of plants are holding up shipments for the present to pass over inventory week at the end of the fiscal year, July 1. The Louisville sanitary interest has not yet closed for its coke requirements for the year. We quote the various producing fields as follows:

	Prompt shipment.	Contract second half.
Connellsville district:		
Foundry coke	$2.00 to 2.25	$2.00 to 2.40
Furnace coke	1.50 to 1.65	1.65 to 1.75
Wise county district:		
Foundry coke	2.00 to 2.25	2.00 to 2.25
Furnace coke	1.75 to 2.00	*Sliding [scale basis.
Pocahontas district:		
Foundry coke	2.00 to 2.15	2.00 to 2.35
Furnace coke	1.60 to 1.75	1.75 to 1.85
New river:		
Foundry coke	2.50 to 3.15	2.60 to 3.25
Furnace coke	2.10 to 2.15	2.10 to 2.20

*Sliding scale basis means $1.60 for coke based on $9, Birmingham, for pig iron, with an advance of 16 2-3 per cent of the amount over $9 at which pig iron is quoted. This is the usual basis. Other forms of sliding contracts are also made.

Finished Material.—A considerable tonnage of business has been closed on a basis of $1.25, Pittsburg, on steel bars and other finished steel, but no attempt is being made to stampede buyers at this price. Several good contracts in thousand-ton lots have been closed with railroad buyers for steel bars, where requirements are exceeding their specifications at the beginning of the year. The sales of spikes and wire material show a considerable increase during the past year.

Old Material.—Although considerable railroad scrap has been sold recently, good melting steel is offered with few takers at good prices. No quantity is moving and prices are only nominal in many cases. We quote the old material market for delivery in consumers' yards, f. o. b. southern Ohio and Cincinnati, as follows:

GROSS TONS.

Old iron rails, gross	$14.00 to 14.50
Old steel, rerolling, gross	13.00 to 14.00
Old iron axles, gross	19.25 to 19.75
Steel melting scrap, gross	11.00 to 11.75
Car wheels, gross	11.50 to 12.50

NET TONS.

Old No. 1 R. R. wrought	$12.25 to 12.75
No. 1 machinery	10.50 to 11.00
No. 1 busheling	9.25 to 9.75
Stove plate	7.75 to 8.25
Machine shop turnings	6.50 to 7.00
Cast borings	5.50 to 6.25
Grate bars	7.75 to 8.50
Sheet scrap, bundled	7.50 to 8.50
No. 1 cast scrap	11.00 to 11.75
Heavy turnings	7.75 to 8.75

PHILADELPHIA

Cuts on Steel Bars Reported—Further Improvement.

July 3.

Pig Iron.—A keener interest by some of the more conservative buyers and the better bookings that the furnaces in this territory have lately taken by reason of the broader inquiry, have stirred anew a hope among makers that some substantial improvement in the market is not far distant. Consumers, unquestionably are covering more freely for their forward needs, showing more disposition to anticipate their extended requirements than they have done for some time, and not an inconsiderable part of the tonnage closed has been done quietly and without announcement. The undercurrent is towards a stronger position of the makers, but the market is still in the buyer's hands and they are able to buy eastern iron at practically their own figures. There has been some movement in malleable iron in this ter-

ritory, one consumer having bought 1,000 to 2,000 tons, which will come from valley makers for last half, and another buyer is asking prices on 1,000 tons for similar shipment. Malleable is quotable in this district at about $15.50 to $15.75, delivered. Foundry iron shows increased sales taken on the basis of $15, delivered, Philadelphia, for 2X, as several eastern makers continue to freely make this price, though some of the furnaces will not shade $14.50, furnace, or practically $15.25, delivered. The Pennsylvania railroad has finally awarded its inquiry for 3,100 tons of coke and 1,500 to 2,000 tons of charcoal iron for third quarter delivery. The coke iron went to central Pennsylvania makers, and the charcoal was divided between lake, eastern and southern makers. A fair selling of charcoal iron is being done in this district, including one lot of 500 tons and at prices ranging from about $19.50 to $20.50, delivered. A pipe maker is still out for 5,000 tons of No. 3 and forge for September shipment. Southern forge continues to undersell northern forge in this district about 50 cents a ton, being available at $9.25 to $9.50, Birmingham. A sale of 500 tons of southern No. 3 to a Virginia buyer at $9.75, Birmingham, with offers of forge at $9.50, is noted. Virginia pipe makers are buying little iron at present, being well covered, but are taking odd lots at $11.50, Virginia furnace, for forge, or about $12.25, delivered. One large basic consumer which has been sounding the market for several weeks, is renewing its offers for a block of 10,000 tons or more for third and fourth quarter. The furnaces, however, are not disposed to break through the $14.50, delivered, minimum, and some makers are holding for $14.75, delivered. Other basic tonnage is in prospect. Little additional selling of low phosphorus has been done. The General Electric Co. is reported to have placed about 1,000 tons with Lebanon makers. The Standish, N. Y., furnace, which is a large seller of standard low phosphorus in eastern territory, has blown in after several months' idleness.

We quote for prompt and third-quarter shipment, as follows:

No. 1X foundry	$15.25 to 15.50
No. 2X foundry	15.00 to 15.25
No. 2 plain	14.50 to 15.00
Standard gray forge	14.25 to 14.50
Basic	14.50 to 14.75
No. 2X Virginia	15.05 to 15.30
No. 2 southern	14.00 to 14.50
Standard low phosphorus	20.50 to 21.00

Coke.—Material on track or under pressure to be sold is being disposed of in the east in certain cases at very low figures, some furnaces having been enabled to pick up lots of not especially low phosphorus coke at $1.30, ovens. For spot Connellsville coke sales range from $1.35 upward, with the standard brands ruling from $1.40 to $1.50, ovens. A Lehigh valley interest closed this week for its July needs, about 10,000 tons, at under $1.50, ovens. A Schuylkill valley consumer took 7,500 tons monthly for third quarter at $1.55 or $1.60, ovens. There is still pending last half requirements for two or three eastern furnaces aggregating 50,000 tons or more.

Finished Material.—Further progress is apparently being made by the improvement in finished lines in eastern territory. Some sellers report their bookings of the past week to have been especially good. The most active branch of the market continues to be structural material and there is a good tonnage coming up in Philadelphia and southeastern territory. Business in other lines continues unevenly distributed as it has been in this movement. Eastern plate mills are getting as good a tonnage as they have been, but this market shows a lack of active car and boat construction. Steel bars have been in livelier demand this week, buyers closing some nice orders for immediate requirement but doing little in contracts. Better specifications in wire and wire nails are coming in. Standard railroad spikes are more active, about 6,000 kegs having been sold to eastern lines this week, including one lot of 2,000 kegs.

Reports of some further price irregularities are current this week. From different directions comes the statement that steel bars have been offered by one maker at 1.20c base, Pittsburg, and small angles at a corresponding reduction. Statements have been made also that plain shapes have sold in occasional cases under 1.35c, Pittsburg, in eastern territory, but these have usually been associated with transactions made by middlemen. Shading in standard railroad spikes is reported.

In structural work, Wells Bros. have the general contract for the Wilkens building, Washington, and the steel, 500 tons, it is unofficially stated, will go to the American Bridge Co. Bids went in this week on the Ritz-Carlton hotel, this city, 1,000 tons, and the Industrial building, Baltimore, 1,100 tons. A 20-story building for the American Trust & Savings Co., Birmingham, Ala., is up for bids July 10, and will take about 2,500 tons. The steel requirements of the Chesapeake & Ohio office building, Richmond, now up for bids, are 2,800 tons. The steel for the addition to the Dupont hotel, Wilmington, Del., 1,200 to 1,500 tons, is not yet definitely placed. An eastern pipe mill is in the market for 3,500 tons of steel skelp for the manufacture of 16-inch pipe.

One of the largest locomotive orders closed for some time has been placed by the Topeka, Atchison & Santa Fe railroad with the Baldwin Locomotive Works, calling for 81 locomotives, including 26 Pacific, 25 Mallet and the balance in switching and miscellaneous types. Eastern mills will furnish the boiler steel for this order.

We quote, for delivery in Philadelphia and vicinity, as follows:

Structural shapes, 1.50c; steel plates, 1.50c; steel bars, 1.40c; refined bar iron, 1.27c to 1.32c; cut nails, $1.75 to $1.80; blue annealed sheets, No. 10 gage, 1.65c; 4 x 4-inch open-hearth rolling billets, $24.40; forging billets, $28.40.

Old Material.—In some particulars the scrap market has a slightly better tone. Heavy melting steel is stronger, more so through sentimental influence than by new buying, as the leading eastern consumers are still drawing against old contracts and are picking at occasional bargain lots. Fresh buying is chiefly between dealers covering on their old contracts or speculating. Iron mill material has been moving a little better in some cases at slightly higher prices, this including borings, turnings and pipe. Cast is dull.

We quote gross tons delivered in eastern Pennsylvania and New Jersey consuming territory as follows:

Old iron rails	$16.50 to 17.00
Old steel rails (rerolling)	13.75 to 14.25
No. 1 heavy melting steel	13.00 to 13.25
Old car wheels	13.00 to 13.50
Old steel car axles	18.00 to 19.00
Old iron car axles	24.00 to 25.00
No. 1 R. R. wrought	15.00 to 15.50
Wrought pipe	12.00 to 12.50
Cast borings	8.00 to 8.50
Wrought turnings	8.75 to 9.25
Heavy cast scrap	13.00 to 13.50
Railroad malleable	11.50 to 12.00
Stove plate	10.00 to 10.50

Freight rates per ton on scrap from Philadelphia to principal eastern consuming points are: $0.60 to Ivy Rock, Pa.; $0.65 to Phoenixville, Pa.; $0.80 to Coatesville, Pa.; $0.85 to Bethlehem, Pa., Reading, Pa., and Roebling, N. J.; $1.10 to Pottsville, Pa., Lebanon, Pa., and Columbia, Pa., and $1.20 to Harrisburg and Steelton, Pa.

The American Rolling Mills Co., Middletown, O., has declared the regular quarterly dividends of 3 per cent on common stock, and of 1½ per cent on preferred, both payable July 15.

The Canadian Car & Foundry Co. has declared the regular quarterly dividend of 1¾ per cent on preferred stock, payable July 25.

The National Tube Co. blew out its No. 4 stack at Lorain on June 29, and Monongahela No. 1 on the same day.

NEW YORK

Subway Work May Soon Begin—Holiday Interrupts Market.

Office of THE IRON TRADE REVIEW,
1115 West Street Bldg., July 3.

Iron Ore.—Considerable interest in the market still attaches to the heavy purchase of Swedish ore, recently made by the Bethlehem Steel Corporation. An accurate statement on the price paid is still withheld. It is understood that not a heavy quantity of the ore will be shipped on the contract the present calendar year. Eastern domestic miners continue to ship at a very fair rate, but new sales are few.

Pig Iron.—A good many buyers seem to be following the theory that their interests can be best served by avoiding formal and generally-distributed inquiry, and an unusual number of sales of a quiet character are being made in metropolitan and northeastern territory, some of them for good-sized lots. Other important business of this kind is in prospect, one large buyer making overtures on a purchase of 5,000 to 10 000 tons of foundry grades. New England malleable buyers, who have been sounding the market for some time, have made a round purchase of this grade, but the tonnage is not given. It is reported that some iron was obtained at lower than the $13, Buffalo base, or $15.45, delivered. These buyers have been seeking offers on lots of from 5,000 to 15,000 tons. Though the written inquiry is not as heavy, some fair sales of this class are being made. The general Electric Co. has closed with New York and eastern Pennsylvania makers for several thousand tons of regular foundry and low phosphorus grades against an inquiry for 6,000 to 7,000 tons for last half delivery at its different eastern plants. Eastern Pennsylvania, Buffalo and other New York state makers continue to compete for New England business at $15.45 to $15.70, delivered, for No. 2X, equivalent to $13 to $13.25, furnace. Considerable Virginia iron is being taken by regular customers at $12.25 to $12.50, furnace, for No. 2X. Some low grade Virginia irons have recently been offered at concessions approximating $11.60, Roanoke, and are understood to have been absorbed by Virginia buyers. The New York State Steel Co. furnace at Buffalo blew out this week, after a short run, but the Standish, N. Y., furnace has again become active on low phosphorus iron.

We quote for prompt and third quarter shipment, as follows:

Northern foundry No. 1	$14.75 to 15.25
No. 2X foundry	14.50 to 15.00
No. 2 plain	14.25 to 14.50
No. 2 Virginia	15.05 to 15.30
No. 2 southern foundry	14.00 to 14.50
Malleable	14.50 to 15.00
Gray forge	14.25 to 14.50

Ferro Alloys.—There is not much to be said of the situation in ferro-alloys. Buyers seem well covered, as inquiries are for small quantities. The market is still easy as to prices. We quote standard 80 per cent ferro manganese at from $35.50 to $36.75, Baltimore, and 50 per cent ferro silicon at from $52 to $52.50, Pittsburg.

Cast Iron Pipe.—The city of Detroit will take direct bids July 11 on 11,000 tons of 8 to 48-inch sizes. Metropolitan boroughs this week are closing by direct letting upon about 2,000 tons of 8 and 12-inch sizes and castings. On contractors' work involving about 2,000 tons for the metropolis which was opened June 28, John S. Gregary submitted the lowest bid. It is currently reported in the market that ownership in one of the southern plants has passed to another pipe maker. Pipe manufacturers have noted more life in the market, considerable of which is in private work. We quote 6-inch pipe at from $21 to $21.50 f. o. b. New York, in carload lots.

Finished Material.—Some improvement continues in finished lines and the general tone of the market grows more encouraging. The holiday interruption has rendered the week of small importance as an index to the situation, as many plants will not operate at over 50 per cent of capacity and a number will be idle all week. An appreciable part of the improvement has been in steel bars in eastern territory and an increased tonnage is being taken by buyers. Some contracting is being done though some buyers are seeking concessions, having heard through numerous reports in the eastern market, a statement that one maker is offering their product at 1.20c, base, Pittsburg. Though the report is well defined, it lacks official confirmation. One buyer was shopping this week with a lot of 2,000 tons of bars trying to develop a 1.20c, Pittsburg, price.

The Bethlehem Steel Co. has taken the contract for the 6,000 tons of steel work for the Bamberger store, Newark, N. J., and will sub-let the fabrication to some other company. Bids have gone in on 1,300 tons of bridge work for the Delaware & Hudson railway. The 1,400 tons for the Rotterdam, N. Y., bridge of the Boston & Maine railroad is reported to have been placed. No award has been made in the Adams Express Co. building, this city, 3 000 tons, and the revised plans for the Aeolian building are not yet out. Bids go in July 10 for the piers for the Old Dominion Steamship Co., at Norfolk, Va., the steel requirement for which it is now estimated may reach 4,000 tons.

Developments in the New York subway situation the past week, have lead to the belief that active construction work may begin by Aug. 1. The signification of its acceptance of the grants tendered it by the city, by the Brooklyn Rapid Transit Co., leaves the public service commission free to proceed with a part of the work, if it so chooses. A number of months ago, construction bids for about $18,000,000 of subway work in Manhattan were taken by the city, and it is expected that the work will begin by the acceptance of these tenders.

The Erie railroad came out this week with its formal car inquiry, which calls for 1,000 steel gondolas, 1,000 steel hoppers, 1,000 steel underframe box, 500 composite gondolas, 200 furniture and 100 automobile cars, and 60 passenger coaches. The Pressed Steel Car Co. has taken an order for 500 steel underframes for box cars and 500 steel underframes for gondola cars to be built by the Northern Pacific in its own shops, and has placed with Pittsburg mills an order for 500 center sills.

We quote for tidewater delivery, as follows:

Angles, 3 to 6 inches and heavier, 1.51c; tees, 3 x ¼ inch and heavier, 1.51c; plates, carload, tank, 1.51c; boiler steel, 1.61c; marine boiler, 1.91c; bar iron, 1.30c to 1.35c; soft steel bars, 1.41c.

Rails and Track Material.—The New Zealand government has placed a large order with English mills, reported as about 50,000 tons, giving preferential consideration to these makers over American manufacturers who competed for the business. There is little contracting in domestic rails for the moment, but a heavy tonnage continues in prospect.

Old Material.—The week starts off very quietly, owing to the closing of the mills for the Fourth, some of which will be down for 10 days to two weeks for inventories and repairs. The market has shown a little more action of late, considerable of which has been in speculative buying and transactions between dealers as consumers are showing no marked change in their hand to mouth buying policies. Heavy steel seems a little stronger and there has been a better movement in some of the iron mill grades. We quote gross tons, prices New York dealers will pay at tide-

water with the excepion of cast scrap, which has a local demand, as follows:

Old car wheels	$11.50 to 12.00
Old iron axles	17.50 to 18.00
Old steel shafting	14.00 to 14.50
No. 1 heavy melting steel	11.00 to 11.25
No. 1 R. R. wrought	12.00 to 12.50
Iron track scrap	11.00 to 11.50
Wrought pipe	10.00 to 10.50
Cast borings	5.75 to 6.00
Wrought turnings	6.00 to 6.50
Heavy cast scrap	11.50 to 12.00
Railroad, malleable	10.00 to 10.50
Stove plate	8.75 to 9.00
Grate bars	9.00 to 9.50

Freight rates on scrap per ton to Steelton, Pa., Columbia, Pa., Pottsville, Pa., and Harrisburg, Pa., are $1.50 from Jersey City and $2.00 from New York; to Coatesville, Pa., Ivy Rock, Pa., Phoenixville, Pa., and Reading, Pa., $1.50 from Jersey City and $1.80 from New York; to Bethlehem, Pa., $1.10 from Jersey City and $1.60 from New York, and to Roebling N. J., $1.00 from Jersey City and $1.50 from New York.

ST. LOUIS

Pig Iron Conditions Brighten as Iron is Sold.

July 3.

Pig Iron.—Conditions brightened the latter part of last week with the sale of 2,000 tons of malleable Bessemer, and another sale of 1,000 tons of southern No. 2, all for delivery in the St. Louis territory over the last half of the year. Inquiries are scarce, however, with prices ranging all the way from $10 to $10.50 for southern No. 2, Birmingham basis. Northern iron is quoted at $13.75 to $14, Ironton, with very little inquiry. Prices on southern iron, delivered, to which the Birmingham freight of $3.75 has been added, follow:

Southern No. 1	$14.25 to 14.75
Southern No. 2	13.75 to 14.25
Southern No. 3	13.50 to 14.00
Southern No. 4	13.25 to 13.75

Coke.—Little inquiry is out for coke, and prices remain as follows:

We quote 72-hour Connellsville foundry grades, $1.90 to $2.40 for whole of 1911; 72-hour foundry, $1.90 to $2.15 on tracks and for immediate delivery; 48-hour Connellsville furnace, $1.40 to $1.50; best 72-hour Virginia foundry, $2 to $2.25; 48-hour Virginia furnace, $1.60 to $1.85. The freight to East St. Louis and St. Louis is $2.80, and $2.70 from the Virginia fields when shipment is destined beyond St. Louis.

Finished Material. — Inquiries and orders for structural material have been quite good within the last week, and customers seem disposed to replenish their stocks, at the Pittsburg basis of 1.35c. Orders have been better for bars. Two inquiries of 500 tons each are out for standard rails, and one sale was made the latter part of last week for 500 tons. Track fastenings are in moderate demand, only. Light rails are in some demand, mostly from the coal mining interests.

Old Material. — The situation remains extremely dull, with prices unchanged.

BUFFALO

Increase in Sales and Inquiry—Prices Still Low.

July 3.

Pig Iron.—Some of the furnaces report that the week just closed was the best in two months, both in the matter of business booked in the district and inquiries from the same territory. Within the last seven days, one of the furnace interests booked in excess of 4,000 tons in the foundry grades, for the most part in small lots. There still continues to be fairly large inquiry from New England. On the whole, the situation looks more encouraging. Though the same prices prevail as a week ago, the furnaces are talking of increasing prices, and this may have helped to bring into the market buyers who have concluded that the bottom of prices has been reached. Although inquiries are coming in for 1912 delivery, the furnaces are refusing to go further ahead than the first of the year. Shipments are going forward satisfactorily. We quote f. o. b. furnace as follows:

No. 1X	$13.25 to 13.75
No. 2X	13.00 to 13.50
No. 2 plain	13.00 to 13.25
No. 3	13.00 to 13.25
Gray forge	13.00 to 13.25
Malleable	13.50 to 13.75
Basic	14.00 to 14.25
Charcoal	16.50 to 17.50

Finished Products. — Specifications for bars and structural material are coming in very well, and prices continue firm. A number of contracts have been placed over third quarter. The improvement which became noticeable a couple of weeks ago is becoming more and more perceptible. While only a few smaller jobs are ready for figures, several larger ones are on the architects' boards and will be ready in the near future.

Old Material.—The scrap market continues dull with very little indication of improvement. Prices are largely nominal.

One of the recent orders secured by the Kennicott Co., of Chicago, is for a self-supporting steel stack from the Kentucky Electric Co., of Louisville, Ky., 13 feet in diameter and 205 feet high.

The Norton Iron Works, Ashland, Ky., relighted its stack June 13.

BIRMINGHAM

Sellers Disposed to Limit Shipments of $10 Iron to Third Quarter.

Birmingham, Ala., July 3.

Pig Iron.—The trading in this market during the past week was comparatively light, the largest transaction reported having involved a lot of 500 tons for shipment during the third quarter. The aggregate of all sales reported is less than 2,500 tons, practically all of which is for comparatively early delivery. No change has been made in the schedule of quotations and a basis of $10 per ton, Birmingham, is considered applicable to deliveries during the last half when an attractive tonnage is offered. There is, however, a tendency on the part of those producers who quote the basis just mentioned to limit shipments to the third quarter. The inquiry for last half deliveries has been of very fair volume and general indications favor a much more satisfactory rate of consumption with the resumption of foundry operations after July 4. It is understood from reliable sources that the stocks on melters' yards are unusually low and it is known that the provision so far made for requirements during the last half is not extensive. The percentage of tonnage engaged for delivery during the first half that will of necessity be carried over into the second half is considerably smaller than was expected at one time. This conservative course on the part of buyers, as has been indicated by conditions existing, is a very significant one at present to the selling agents and has been very effective in fixing the policy of the producing interests. At this time, a total of 7,500 tons for shipment during the last half is represented by bona fide inquiries with an occasional round tonnage proposition offered to cover the first half of next year. Of this last, the furnace operators are probably more indifferent than for some weeks and refuse absolutely to name a quotation other than nominal. The inquiry for spot iron is considerably lighter than for one week ago, which is accounted for in the general disposition of founders to closely adjust their receipts to actual consumption just prior to July 1. We do not yet see fit to quote a price for last quarter deliveries, but continue to quote as below for prompt deliveries or shipments through the third quarter. We quote, per gross ton, f. o. b.

Birmingham furnaces, as follows:

No. 1 foundry	$10.50
No. 2 foundry	10.00
No. 2 soft	10.00
No. 3 foundry	9.50
No. 4 foundry	9.25
Gray forge	9.00
Basic, chill cast	10.25

Small Shipments of Pig Iron.—Finished Material for Alaska.

Seattle, June 29.

Pig Iron.—Very small shipments of iron are being brought into the North Pacific states at the present time, the consumers relying upon the southern and eastern grades. Some of the jobbers who brought in English brands a couple of months ago still have it on hand and there is little prospect of its being moved in the near future. The lumber men are still holding back on the output and as a result there is a like depression in the foundry business. Some of the foundries are still running on half time as noted a month ago. We quote foreign iron in gross tons exship Puget Sound or Columbia river delivery f. o. b. Pacific coast terminals as follows:

	Prompt.	Third quarter.
No. 1 Glengarnock	$23.50	$23.50
No. 1 Eglinton	22.50	23.00
No. 1 English Jarrow	22.50	22.50
No. 1 Chinese Hanyang	22.00	22.00
No. 1 Cleveland	22.50	22.50
English Doncaster	22.00	22.00

Finished Material.—The delivery of a large amount of sheets and bars to municipal buyers was noted this week. The building activities at Portland and Vancouver, B. C., are still at high mark and there is little prospect of there being a lull in this line for some time to come. The opening of the Alaska season has also seen a large amount of finished material shipped into that country for new operations. The opening of the Copper River Railroad has had a decided effect on the markets in that quarter and a general advancement in this field is expected.

Coke.—The importation of the various foreign brands of coke on the North Pacific coast has been found to be a most profitable business by a few jobbers and every vessel that comes from the United Kingdom and Germany has a large amount on board. A German syndicate coal, which is being shipped from Antwerp and which sells to the local consumers at from $12 to $12.50 per ton is much in demand, especially for heavy casting work.

METAL MARKETS

St. Louis

July 3.

Lead and Zinc.—A top price of $46 a ton was paid for zinc blende in the Missouri-Kansas-Oklahoma district last week, on an assay base of $43 for 60 per cent ore. For car lots, the price ranged down to $40. Contract ore brought $42.27 on a basis of the previous week's spelter average of 5.62c, East St. Louis. The contract price was the strongest of the year, however, a price of $43.50 was made in the open market last March. Calamine was steady at $23 a ton on an assay base of 40 per cent, ranging down to $20. Lead ore remained at $58 and $60 a ton. The surplus of blende was decreased by heavy shipments. The total valuation of all ores shipped was $307,469, the heaviest of the year.

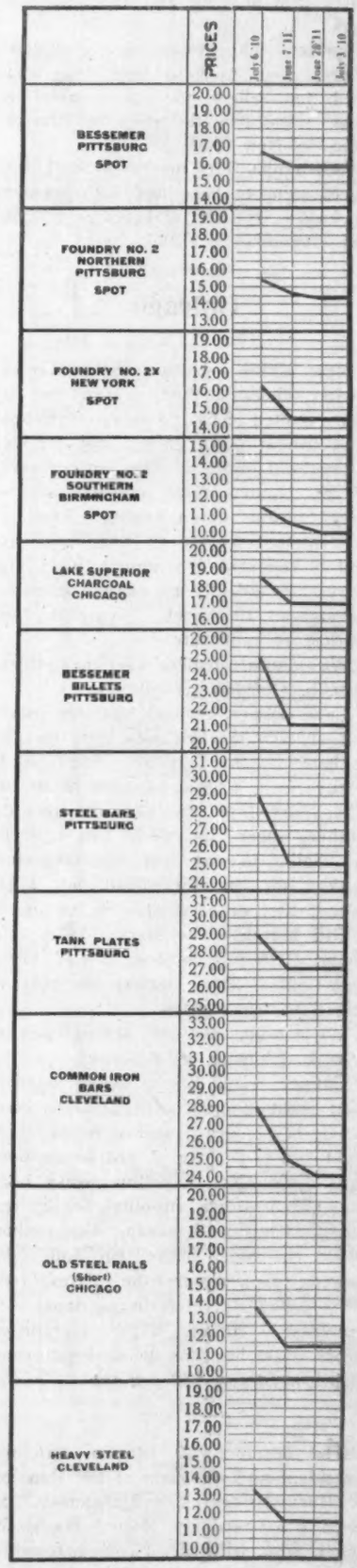
New York

July 3.

Tin.—The expectation of closing business places over July 4, together with the extreme heat, have had a quieting influence on the pig tin market. Prices are hardly more than nominal. Domestic consumers are not disposed to pay the high premium which is asked on spot, and the aggregate of tin bought for immediate delivery is probably the smallest total in any week of the second quarter of 1911. The demand for July and August compares more favorably. Spot tin closed nominally at 44.50c, and July and August at 43c and 42.25c, respectively. Deliveries into domestic consumption amounted to 2,900 tons during June and arrivals at Atlantic ports aggregated 1,822 tons after deducting 250 which were exported. Stocks, including tin on dock and landing June 30, amounted to 966 tons. Shipments from the Straits in June were large, amounting to 5,060 tons. The net result of operations in Europe and the United States during June, is an increase in the total visible supply of 667 tons.

Copper.—Trade has become very quiet and resale lots are being offered below the asking prices of the leading producers. The latter, however, claim to be well booked for July, August and part of September, and are firm in quotations. Electrolytic sold late last week at 12.50c cash, and that price could probably be duplicated today, but, as stated, it does not represent first-hand stock. The important agencies are quoting lake at 12.87½c, and electrolytic at 12.75c, delivered 30 days. Copper exports for June were 30,074

PRICE CHART



tons, and this is the largest monthly total reported since Jan. 1, 1911.

Lead.—No change is noted in the market. Inquiry is light in volume and prices firm at 4.50c and 4.55c, in New York.

Spelter.—The present needs of consumers seem to have been fully supplied, but sellers are not disposed to force sales, and the price is firm at 5.75c, in New York.

Antimony.—The market is dull and prices seem to have met with support. Cookson's is 8.50c, Hallett's is 8.12½c, and Hungarian is 7.20c.

Chicago

July 3.

New Metals.—During the past week spelter declined $1.00 a ton and is now quoted 5.65c, Chicago. While this metal was firm and active throughout most of the entire week at St. Louis, local consumers are very cautious about buying. Lead is now quoted 4.42½c to 4.45c, Chicago and is reported firm and active. Tin showed practically no change in price throughout the week; buying in this market is moderate.

We quote, dealers' selling prices, f. o. b. Chicago, as follows:

Lake copper, carload lots, 13c; casting, 12¾c; smaller lots, ¼c to ⅜c higher. Spelter, car lots, 5.65c; lead, desilverized, 4.42½c to 4.45c in 50-ton lots; corroding, 25c per 100 pounds higher; sheet zinc, $7.25 list, f. o. b. La Salle, in car lots of 600-pound casks; pig tin, 45c; Cookson's antimony, 10c; other grades, 9c to 10c.

Old Metals.—The market is in fair shape. Tin pipe is now quoted 39½c and tin foil 38c. Dealers are not inclined to press sales.

We quote, dealers' selling prices, f. o. b. Chicago, as follows:

Copper wire, 12½c; heavy copper, 12c; light copper, 10½c; heavy red brass, 10½c; heavy yellow brass, 9¼c, light brass, 7c; No. 1 red brass borings, 9½c; No. 1 yellow brass borings, 7½c; brass clippings, 8½c; tea lead, 3.80c; lead scrap, 4½c; zinc, 4½c; tin pipe, 39½c, tin foil, 38c, pewter, 27c; electrotype plates, free from wood, 4c; electrotype dross, 3c; stereotype plates, 4½c; stereotype dross, 3¼c; linotype dross, 3¼c; prime slab zinc dross, $70 per ton.

The interest of Alonzo Pawling, president and treasurer of the Pawling & Harnischfeger Co., Milwaukee, has been purchased by Henry Harnischfeger, who, with Mr. Pawling, founded the organization 26 years ago.

MORE INQUIRY

For Pig Iron—Bridge Company Awarded Contract For Steel Work.

Pittsburg, July 5. (By wire.)

There is more general inquiry for pig iron at present than for some months. With few exceptions individual inquiries call for small lots for early shipment, but the aggregate tonnage is large. Furnaces continue to ask $13.25, valley, for basic and an offer of $13.25, valley, for 5,000 tons of this grade for fourth quarter shipment has been made.

The Pennsylvania Bridge Co., Beaver Falls, Pa., has received a contract for structural steel work on the Ohio river dam, at New Martinsville, W. Va., and the New York state barge canal, involving 2,500 tons.

The Pennsylvania Railroad Co. today asked for bids for 15,000 tons of old material on which bids will close July 11.

A large number of steel mills resumed operations this morning after having been closed since June 30. Other mills will be started later in the week. Leading interests are expected to put on a number of extra additional sheet mills about July 10.

One or two companies have reaffirmed the Sons of Vulcan wage scale for the year beginning July 1, and the remainder of the 14 companies dealing with this organization are expected to sign the scale later in the week.

Annual Report of American Car & Foundry Co.

The report of the American Car & Foundry Co. for the year ending April 30, just made public, compares as to its income account with the previous year as follows:

	1911.	Increase.
Earnings, all sources	$ 6,240,324	$ 515,226
Renewals, etc.	2,005,535	369,915
Net earnings	$ 4,234,789	$ 145,311
Maint., impts., etc.	750,000	750,000
Balance for divs.	$ 3,484,789	*$ 604,689
Preferred dividend	2,100,000	.....
Balance for common	$ 1,386,789	*$ 604,689
Common dividend	600,000	.....
Surplus	$ 784,789	*$ 604,689
Previous surplus	23,952,556	1,389,478
Total surplus	$24,737,345	$ 784,789

*Decrease.

In his report to the stockholders President F. H. Eaton says that during the earlier portion of the fiscal year just closed there were evidences of an increased demand for new equipment but the promise of the earlier months was not fulfilled by the accomplishment later in the year. The railroad demands for new equipment were in the aggregate much less during the last fiscal year than in 1910. Because of this orders were taken on an even more strongly competitive basis than heretofore, and consequently on a lessened profit margin. During the year the company's new car shop at St. Charles was completed, and the company secured absolute ownership of the entire outstanding capital stock of the Jackson & Sharp Co., the former owner of the Wilmington plant. The company has had a fair measure of success in the building up of export business which, with proper effort, may be continued in the future.

Report of the Alabama Consolidated

Gross sales of the Alabama Consolidated Coal & Iron Co. for the year, ended Oct. 31, 1910, were $2,036,401, according to a financial statement just issued bearing upon the consolidating of the company with the Southern Iron & Steel Co., which is now under arrangement. The manufacturing costs were $1,789,434, making net earnings $246,967, which with other income make the total income from all sources $377,950. During the year $102,747 was expended for improvements and after the deduction of interest charges, reserve for exhaustion of minerals but not before provision for stockholders, the net income was $106,322.

Officially Denied

New York, July 5. (By wire.)

The report that the United States Cast Iron Pipe & Foundry Co. has acquired the Dimmick Pipe Foundry, Birmingham, is officially denied.

New Jobbing Firm.—The Betz-Pierce Co. has been incorporated to carry on a jobbing business in Cleveland. It will represent the Colonial Steel Co., Pittsburg, selling its high grade crucible tool steel and open-hearth steel, and also screw stock, shafting, cold rolled strip steel, and high grade sheets. The company will have a warehouse at Payne avenue and East Seventeenth street Sept 1. For the present, the offices are located at 702 Engineers' building, but will shortly be at 2432 East Ninth street. The company will be managed by Arthur B. Betz and Clifford E. Pierce, who have been associated with the Bassett-Presley Co. for many years.

Indictments Returned Against Many Wire Makers

By New York Federal Grand Jury in Alleged Violation of Sherman Anti-Trust Act

Indictments charging violation of the Sherman anti-trust act through the alleged restraint of competition were returned at New York, June 29, by a federal grand jury against 83 officers, directors and employes of companies engaged in the manufacture of various wire products and of horse shoes. The specific charge is that the defendant manufacturers were parties to nine "pools" or associations, which, it is charged, by written agreements and through a supervisor arbitrarily fixed prices and restricted the output of the different members in accordance with an arbitrary rating upon each plant. This supervisor, it is charged, received and distributed reports of sales of the different companies, levied fines in case allotments of production were exceeded, fixed prices, and was the moving spirit of the associations. The government declares that Edward E. Jackson Jr., an attorney of 52 William street, New York City, acted as the supervisor of the pools and the latter has been indicted nine times upon such a count.

It is not charged by the government that the pools are now in existence. Most of them, it is stated, voluntarily went out of business about November, 1909, after having been in operation since their formation, June 1, 1908. One association, it is declared, held over until sometime in 1910. The indictments set forth the allegation, however, that the government authorities believe from the correspondence in their possession that the intent for which these associations were originally created, has been continued in effect.

The indictments are returned against individuals upon the ground that they were members of the various "pools," and not against the companies with which they were connected. William P. Palmer, president, and Frank Baackes, general sales manager, of the American Steel & Wire Co., a subsidiary of the United States Steel Corporation, are indicted seven times as having belonged to seven associations; Ferdinand W. Roebling, secretary and treasurer of John A. Roebling's Sons Co., Trenton, N. J., is indicted eight times; Joseph W. Marsh, president of the Standard Underground Cable Co., six times, and other well known manufacturers included are Charles F. Brooker, vice president of the Ansonia Brass & Copper Co.; Frank J. Gould, president of the Old Dominion Iron & Nail Works, Richmond, Va.; Herbert L. Satterlee, president of the Habirshaw Wire Co., Yonkers, N. Y., and son-in-law of J. P. Morgan; Henry G. Stoddard, president, and Erskine Hewitt, vice president of the Trenton Iron Co., Trenton, N. J.; Frank N. Phillips, president of the American Electric Works, and others. In all, 35 different corporations are involved through their officers, directors and employes.

How Pools Operated.

The nine different "pools" and the extent to which they dominated the trade, according to the government's allegations, are as follows: Fine Wire Magnet Association, 85 per cent control; Underground Power Cable Association, 95 per cent control; Horseshoe Manufacturers' Association, 70 per cent control; Bare Copper Wire Association, 95 per cent control; Telephone Cable Association, 80 per cent control; Rubber Covered Wire Association, 80 per cent control; Lead Encased Cable Association, 80 per cent control; Wire Rope Manufacturers' Association, 80 per cent control, and the Weatherproof & Magnet Wire Association, 90 per cent control. A so-called general deposit was established, ranging from $1,000 to $5,000, according to the association, and in addition, the government declares, each member was obliged to pay into the general deposit fund a small percentage of the selling price of his previous month's business, usually 1 to 2 per cent. When the companies exceeded their prescribed allotment of business each month, it is charged, they were assessed a remittance, known as "guaranteed deposits," which was determined through a fixed percentage of the excessive sales and varying from 10 to 32 per cent with some associations, and from 50 to 65 cents per 100 pounds of sales over the prescribed amount, in others.

A complete list of the persons indicted, classified according to their alleged membership in the various associations, is as follows:

HORSESHOE MANUFACTURERS' ASSOCIATION.

William P. Palmer, president of the American Steel & Wire Co.; Frank Baackes, vice president and general sales agent; George F. Rummell, George A. Cragin, and Dennis A. Merriman, assistant general sales agents, and Frank A. Keys and Charles W. Bassett, salesmen.

Frank J. Gould, president of the Old Dominion Wire & Nail Works of Virginia; Charles H. Holton, president of the American Horseshoe Co., of New Jersey, and Philip S. Dyer, secretary and treasurer.

George E. Holton, president of the Bryden Horseshoe Co., of Pennsylvania.

John W. Kiser, president of the Phoenix Horshoe Co. of Illinois; James D. Keith, first vice president, and Samuel H. Roberts, secretary and treasurer.

Francis W. Carpenter, president of the Rhode Island-Perkins Horseshoe Co.; Richard W. Comstock, vice president; Ralph C. Watrous, second vice president, and George L. Bowen, general sales manager.

BARE COPPER WIRE ASSOCIATION.

Officers of the American Steel & Wire Co., mentioned above.

Frank N. Philips, president of the American Electrical Works of Rhode Island; Eugene R. Philips, vice president, and "Charles" R. Remington Jr., (the name Charles being fictitious) secretary.

Alfred A. Cowles, president of the Ansonia Brass & Copper Co. of Connecticut; Charles F. Brooker, its vice president; Russell A. Cowles, treasurer.

Edward L. Frisbie Jr., president of the Benedict & Burnham Manufacturing Co., of Connecticut; "Arthur" M. Dickinson, (the name Arthur being fictitious) secretary; and Thomas B. Kent, treasurer.

Charles F. Brooker, president of the Coe Brass Mfg. Co., of Connecticut, and James A. Doughty, vice president.

Edward S. Perot, president of the National Conduit & Cable Co. of New York, and George J. Jackson, secretary.

Ferdinand W. Roebling, secretary and treasurer of the John A. Roebling's Sons Co. of New Jersey, and Carl J. Roebling, general sales agent.

Joseph W. Marsh, president of the Standard Underground Cable Co., of Pennsylvania; "William" A. Connor, (William being fictitious) first vice president; Philip H. W. Smith, second vice president, and Charles J. Marsh, New York City sales manager.

THE RUBBER-COVERED WIRE ASSOCIATION.

Officers of the American Steel & Wire Co. mentioned above.

Officers of the American Electrical Works mentioned above.

Ferdinand J. Roebling and "Frank" J. Newbury, (Frank being fictitious) of the John A. Roebling's Sons Co., mentioned above.

Henry A. Read, president of the Bishop Gutta Percha Co. of New York; Henry D. Reed, vice president, and W. Boardman Reed, its general manager.

C. Edward Murray, treasurer and general manager of the Crescent Belting & Packing Co. of New Jersey.

Herbert L. Satterlee, president; Frank J. Hall, treasurer, and James B. Olson, secretary of the Habirshaw Wire Co. of New York.

Thomas F. Ryman, president of the Hazard Mfg. Co., of Pennsylvania; Henry D. Ashley, vice president; John C. Bridgman, general manager, and George B. North, sales manager.

James A. Silberling, president of the Indiana Rubber & Insulated Wire Co., and Robert W. Sieberling, its secretary.

Robert E. Lucas, secretary and general manager of the Marion Insulated Wire & Rubber Co. of Indiana.

Le Baron C. Colt, secretary and general manager of the National India Rubber Co. of Rhode Island, and Fred L. Dunbar, its general superintendent.

R. E. Gallaher, secretary of the New

York Insulated Wire Co., and William H. Hall Jr., salesman.

Herbert O. Philips, treasurer and general manager of the Philips Insulated Wire Co., of Rhode Island, and F. W. Fred Fields, salesman.

Le Roy Clark, president of the Safety Insulated Wire & Cable Co. of New Jersey, and George B. Wilson, its treasurer.

Charles A. Morss, treasurer of the Simplex Electrical Co., of Massachusetts, and John H. Mason, its salesman.

Officers of the Standard Underground Cable Co., mentioned above.

Danna A. Bullen, salesman for the General Electric Co., of New York, and Wallace S. Clark, assistant salesman.

UNDERGROUND POWER AND CABLE ASSOCIATION.

Officers of the American Steel & Wire Co., mentioned above.

Officers of the John A. Roebling's Sons Co., mentioned above.

Officers of the Standard Underground Cable Co., mentioned above.

FINE WIRE MAGNET ASSOCIATION.

Officers of the John A. Roebling's Sons Co., mentioned above.

Officers of the American Electrical Works, mentioned above.

Joseph C. Belden, president of the Belden Mfg. Co., of Illinois, Newell B. Parsons, its vice president, and Wallace D. Rumsey, its treasurer.

William S. Kyle, doing business under the firm name of Bradford, Kyle & Co., at Plymouth, Mass.

Thomas Wallace Jr., president of the Ansonia Electrical Co., of Connecticut, and Louis F. Anschutz, its secretary and treasurer.

Alfred F. Moore and Antoine Bournonville, doing business under the firm name of Alfred F. Moore in Philadelphia, and Edwin Bartram, their agent and general salesman.

Benjamin S. Webb, president of the New England Electrical Works, of Lisbon, N. H.

Frank M. Potter Jr., president of the Wire & Telephone Co. of America, a New York concern, and "Henry" A. Hammond, (Henry being fictitious) its sales manager.

TELEPHONE CABLE ASSOCIATION.

Officers of the American Electrical Works, mentioned above.

Officers of the National Conduit & Cable Co., mentioned above.

Officers of the Standard Underground Cable Co., mentioned above.

LEAD ENCASED RUBBER CABLE ASSOCIATION.

Officers of the American Steel & Wire Co., mentioned above.

Officers of the Habirshaw Wire Co., mentioned above.

Officers of the John A. Roebling's Sons Co., mentioned above.

Officers of the Safety Insulated & Cable Co., mentioned above.

Officers of the Simplex Electric Co., mentioned above.

Officers of the Standard Underground Cable Co., mentioned above.

WIRE ROPE MANUFACTURERS.

Officers of the American Steel & Wire Co., mentioned above.

John Broderick, president of the Broderick & Bascom Rope Co., of St. Louis, Mo., and Seattle, and Joseph D. Bascom, its secretary and treasurer.

Officers of the Hazard Mfg. Co., mentioned above.

Henry Leschen, president of the A. Leschen & Sons Rope Co., of Wellston, Mo., and John A. Leschen, its vice president.

Officers of the John A. Roebling's Sons Co., mentioned above.

Henry G. Stoddard, president of the Trenton Iron Co., and Erskine Hewitt, its vice president.

WEATHER PROOF AND MAGNET WIRE ASSOCIATION.

Officers of the American Steel & Wire Co., mentioned above.

Officers of the American Electrical Works, mentioned above.

Officers of the Ansonia Brass & Copper Co., mentioned above.

Officers of the Ansonia Electrical Co., mentioned above.

Officers of the Benedict & Burnham Mfg. Co., mentioned above.

Officers of the Hazard Mfg. Co., mentioned above.

Officers of the National Conduit & Cable Co., mentioned above.

Officers of the Philips Insulated Wire Co., mentioned above.

Officers of the John A. Roebling's Sons Co., mentioned above.

Officers of the Standard Underground Cable Co., mentioned above.

Alfred F. Moore and Antoine Bournonville, mentioned above.

GENERAL "SUPERVISOR."

Edwin E. Jackson Jr., of New York City.

STEEL CORPORATION

Reported Upon by Commissioner Knox Smith—How Its Assets Have Increased.

Herbert Knox Smith, commissioner of corporations, has submitted to President Taft Part I of the report on the steel industry. This part deals with the organization, investment, profits and position in the industry of the United States Steel Corporation. Additional parts will be submitted later, dealing with costs and prices. The report is not remarkable for important conclusions or caustic criticism. As to the capitalization of the Corporation, the principal difference between the basis as determined by the Corporation itself and the basis determined by the bureau is in the valuation placed upon iron ore deposits. The bureau finds that in 1901 the fair market value of tangible property of the Corporation was about $700,000,000, slightly less than one-half its capitalization. The bureau used three separate methods in valuing assets in 1901: (a) By historical study of the formation of constituent concerns; (b) by market values of the securities of the constituent concerns; (c) by detailed estimates of physical properties classified by departments of business. Valuation by the third method was as follows:

Manufacturing properties, including blast furnaces	$250,000,000
Transportation properties	91,500,000
Coal and coke properties	80,000,000
Natural gas and limestone properties	24,000,000
Current assets	136,500,000
Ore properties	100,000,000
Total	$682,000,000

If iron ore properties are omitted in each case, the estimate of the Steel Corporation in 1902 exceeded the valuation of the bureau by about 30 per cent, but in ore, the bureau's valuation was $100,000,000, while the Corporation's was $700,000,000. The bureau believes that the entire tangible property of the Corporation from the time of its formation was not over half of its capitalization, but in 1910 the excess of capitalization was only about $280,000,000 or 24 per cent.

As against 60 per cent of all crude and finished steel production in 1901, the Corporation now makes not much over 50 per cent, "indicating," says Mr. Smith, "conclusively the continuous presence of strong and increasing independent production." The Corporation's position in ore reserves is much stronger than in any period in the business. Of the lake ores, it has about 75 per cent. In concluding his letter of transmittal, Commissioner Smith says:

There is much significance, also in the prevailing custom of leasing ore mines under royalty instead of purchasing outright. This system, as applied in the lake ore region, without any effective restrictions as to size of holdings, plainly facilitates concentration of ore property, as it greatly reduces the investment required to control large bodies of ore. It has unquestionably had a large influence in producing the high concentration of control now existing in lake ores as well as elsewhere.

Thus, the industry itself rests physically on the ore; the Corporation based one-half its capitalization on the ore; its profits on ore, as will be shown, are large, and in the ore is its highest degree of concentration and control. The ore, therefore, is of primary significance in the Corporation's dominance, and in that resource chiefly are involved the industry's problems of ultimate public interest.

Concerning the high royalty named in the lease of the Hill lands, Commissioner Smith says that this lease, instead of being indicative of a marked enhancement in ore values, is rather evidence of the extent to which the Steel Corporation was willing to go in order to prevent this ore from falling into the hands of rival interests.

The profits earned upon the investment of the Steel Corporation, as computed by the bureau, have averaged 12 per cent for the entire period from 1901 to 1910. The extreme range was from 7.6 per cent in 1904 to 15.9 per cent in 1902.

Launching of the Col. J. M. Schoonmaker

The bulk freighter Col. J. M. Schoonmaker was launched at the Ecorse yard of the Great Lakes Engineering Works on Saturday last, and was christened by Miss Gretchen V. Schoonmaker, daughter of Col. Schoonmaker, of Pittsburg, who is vice president of the Pittsburg & Lake Erie railroad. The Schoonmaker is the largest bulk freighter on the lakes, being 617 feet over all, 597 feet keel, 64 feet beam and 33 feet molded depth. It is expected that she will carry about 14,000 tons of ore in the Lake Erie trade and about 15,000 tons in Lake Michigan trade. She is building for the Shenango Steamship Co., of which Wm. P. Snyder, of Pittsburg, is president.

The Perry Iron Co., Erie, Pa., took the blast off its stack July 1.

Smallest Half-Year Production in Two Years

Yet June Pig Iron Output Was Not so Small as Promised Two Weeks Ago

Curtailment of blast furnace output continued in June, according to the figures received from the various stacks of the country. But the curtailment was not so great as appeared possible some days ago. Yet the half year ends with a smaller total production of coke and anthracite pig iron than any half year since the first half of 1909. The output in the first half of 1909 was 10,820,672 tons, while that for the first half of 1911 was 11,411,405 tons. The second half of 1909 produced 14,516,330 tons; the first half of 1910 produced 14,753,449 tons, which was 3,342,044 tons more than the first half just closed; and the second half of 1910 produced 12,086,865 tons, which was 675,460 tons more than did the half year just passed.

MONTHLY PRODUCTION.

	1911.	1910.	1909.
January	1,766,658	2,599,995	1,788,164
February	1,781,285	2,428,937	1,682,470
March	2,165,764	2,583,736	1,822,644
April	2,044,904	2,477,700	1,730,608
May	1,871,388	2,374,802	1,866,757
June	1,781,406	2,282,279	1,930,029
July		2,158,124	2,088,620
August		2,103,791	2,232,642
September		2,048,461	2,375,589
October		2,086,205	2,604,037
November		1,910,385	2,532,740
December		1,779,899	2,682,702
Total	11,411,405	26,840,314	25,337,002

The total output of coke and anthracite pig iron in June was 1,781,406 tons, compared with 1,871,388 tons in May, a loss of 89,982 tons in June, although it must be remembered that June had one less working day than May. The daily average production in June was 59,380 tons, compared with 60,367 tons in May, a loss in June of 987 tons. The merchant furnaces produced in June 476,493 tons, compared with 538,788 tons in May, a loss in June of 62,295 tons. The non-merchant or steel plant furnaces produced in June 1,276,238 tons, compared with 1,316,276 tons in May, a loss in June of 40,038 tons.

AVERAGE DAILY PRODUCTION.

	1911	1910.
January	56,989	83,871
February	63,617	86,747
March	69,863	83,580
April	68,163	82,590
May	60,367	76,607
June	59,380	76,276
July	.....	69,617
August	.....	67,864
September	.....	68,282
October	.....	67,297
November	.....	63,679
December	.....	57,192

The number of stacks active on the last day of June was 202, compared with 206 on the last day of May, a net loss of four from the active list in June. In four states a net total of six stacks was relighted in June; New York and Illinois, two each, and Virginia and Kentucky, one each. In four other states a net total of 10 stacks was blown out; Ohio seven, Pennsylvania, Alabama and Tennessee one each. Further analysis of the situation shows that of the merchant furnaces in June five were relighted, while eight were blown out, making a net total of three merchant furnaces blown out. Of the non-merchant or steel plant furnaces, six were relighted in June while seven were blown out, making a net total of one blown out. In all, 11 furnaces were relighted during June while 15 were blown out.

The production of spiegel in June was 19,141 tons, compared with 4,053 tons in May, a gain in June of 15,088 tons. The output of ferro in June was 9,534 tons compared with 12,271 tons in May, a loss in June of 2,737 tons.

JUNE PIG IRON REPORT.

STATES.	NO. OF STACKS.		NO. IN BLAST LAST DAY OF MONTH.		TOTAL TONNAGE MADE.		TOTALS.	
	June.	May.	Merchant.	Non-Merchant.	June.	May.
Pennsylvania	157	79	80	121,081	572,730	693,811	731,055
Ohio	71	36	43	98,926	309,483	408,409	449,692
Alabama	45	16	17	110,691	12,726	123,417	131,804
Virginia	24	9	8	22,601	———	22,601	26,528
New York	27	15	13	50,601	81,239	131,840	132,030
New Jersey	7	1	1	3,600	———	3,600	5,688
Illinois	26	16	14	18,183	148,587	166,770	159,647
Colorado	6	3	3				
Indiana	8	6	6	4,790	125,400	130,190	141,572
Maryland	4	3	3				
Wisconsin	6	1	1				
Kentucky	7	2	1				
West Virginia	4	3	3	28,972	26,073	55,045	59,759
Tennessee	18	8	9				
Washington	1	0	0				
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	1	1	1	17,048	———	17,048	17,289
Michigan	3	2	2				
Missouri	1	1	1				
Spiegel—All states						19,141	4,053
Ferro—All states						9,534	12,271
Totals	421	202	206	476,493	1,276,238	1,781,406	1,871,388

Blast Furnace Notes

The New Jersey Zinc Co. blew in its second Palmerton, Pa., stack on June 1.

The Youngstown Sheet & Tube Co., Youngstown, O., blew in its "A" stack on June 8.

The Pennsylvania Steel Co. blew in its No. 2 stack, at Steelton, on June 1, and blew out its No. 3 stack June 3.

The Sloss-Sheffield Steel & Iron Co. blew out North Birmingham stack No. 3 on June 7.

Corrigan, McKinney & Co. relighted their Gennessee, N. Y., stack on June 20.

The Illinois Steel Co. blew in South Works stacks Nos. 1 and 8 on June 25.

Belfont Iron Works Co., Ironton, O., blew out its blast furnace on June 15.

The Columbus Iron & Steel Co., Columbus, O., blew out on June 24 the stack it had been operating.

The Girard Iron Co., Girard, O., blew out its Mattie stack on June 16.

The Clinton Iron & Steel Co., Pittsburg, blew out its furnace June 6.

The Kittanning Iron & Steel Co. blew out its Rebecca furnace on June 11.

The Bethlehem Steel Co. blew out one large South Bethlehem, Pa., stack on June 22.

The American Steel & Wire Co. took the blast off its Emma stack at Cleveland on June 21.

EXPORTS HEAVY

Pig Iron Market Dull.—Rail Sales Light.

New York, July 5. (By wire.)

The pig iron market is dull today, following the holiday. Fresh inquiry is small. A new Jersey buyer took 800 tons of No. 2X for last half from Buffalo.

Rail sales are small. The Illinois Steel Co. this week took 8,500 tons including one lot of 3,800 to a western line and another 1,700. The Pennsylvania Steel Co. has sold the Jacksonville Terminal Co. 800 to 1,000 tons. The export steel trade continues heavy, June having been a very large month. Indications are that the year's business of the leading exporting interest will considerably exceed 2,000,000 tons.

Death of Howard Wood

Howard Wood, president of the Alan Wood Iron & Steel Co., Philadelphia, and a member of one of the most prominent families actively identified with the development of the iron and steel industry of eastern Pennsylvania, died in the Bryn Mawr hospital, Philadelphia, July 1. He has been in ill health for several months. His age was 66 years.

Mr. Wood was the son of Alan Wood, Sr., who was one of the pioneer ironmasters of the historic Schuylkill valley region in eastern Pennsylvania, having built the Schuylkill Iron Works, at Conshohocken, Pa., in 1858, the business of which was originally established about 1826. This plant was one of the early sheet mills of the country, manufacturing besides this product, muck bar, bar iron, iron and steel, flue steel, etc. In 1902, the company built a modern steel works at Ivy Rock, Pa., consisting of nine open-hearth furnaces. About a year ago, the Alan Wood Iron & Steel Co. absorbed the blast furnace plant of the Richard Heckscher & Sons' Co., composed of two stacks and located at Swedeland, Pa., immediately across the Schuylkill river from Ivy Rock.

For the past several months, Mr. Wood had been in poor health and had been under a physician's care at his country place at Wood Lane, Pa. His condition became so serious that his removal to the hospital was necessitated and an operation was resorted to on Monday. This failed of its purpose and death resulted Saturday night. Mr. Wood was a graduate of the University of Pennsylvania of the class of 1864 and had spent practically all his business life in the service of the company which his father founded.

Personal

W. L. Saunders, president of the Ingersoll-Rand Co., New York, has been elected a director of the International Harvester Co.

William M. Armstrong, formerly vice president of the F. A. Goodrich Co., St. Louis, has become president of the Corrugated Bar Co., that city.

George H. Benzenberg, M. Am. Soc. C. E., Milwaukee, Wis., was awarded the degree of doctor of science at the annual commencement of the University of Wisconsin.

W. C. Mitchell, formerly with the Dominion Steel Corporation at Sydney, N. S., has been appointed general superintendent of the Algoma Steel Co., Sault St. Marie.

Cornelius T. Myers, formerly assistant secretary and assistant treasurer of the Wisconsin Engine Co., Corliss, Wis., has become identified with the General Motors Co., Detroit.

D. J. Lewis Jr. has retired as manager of the Bundy department of the American Radiator Co., and has become sales manager of the Lytton Mfg. Corporation, New York.

E. F. Gwynn, president of the Gwynn Gas Burner & Engineering Co., Pittsburg, has returned from Hot Springs, Ark., after having established agencies at Hot Springs and Little Rock, Ark.

Earle J. Banta, formerly chief engineer of the Vulcan Steam Shovel Co., Toledo, O., has been appointed general sales manager of the Davenport Locomotive Works, Davenport, Ia.

J. J. Chisholm has accepted a position as superintendent of power for the Tennessee Coal, Iron & Railroad Co. He was formerly chief engineer of the East Pittsburg power house of the Westinghouse Electric & Mfg. Co.

J. T. McCleary, secretary of the American Iron and Steel Institute, sailed from New York, Saturday, July 1, for Brussels, Belgium, where he will attend some of the sessions of the international steel conference. Mr. McCleary will spend some time in Europe before returning.

W. C. Sayle has been elected assistant secretary of the Cleveland Punch & Shear Works Co., Cleveland, to relieve C. C. Swift, secretary of the company, who is now devoting most of his time to the affairs of the Ohio Machine & Tool Co., Kenton, O. The latter concern was recently taken over by the Cleveland Punch & Shear Works Co.

Col. Henry G. Prout, vice president and general manager of the Union Switch & Signal Co., Swissvale, Pa., has received from the University of Michigan the honorary degree of doctor of laws. Col. Prout graduated from Michigan in 1871 with the degree of civil engineer, and in 1902 received the honorary degree of master of arts from Yale University.

Charles F. Scott, past president of the American Institute of Electric Engineers, has been appointed professor of electrical engineering at Yale University. Mr. Scott graduated from Ohio State University in 1885 and later took a post graduate course at Johns Hopkins. For a number of years past he has been employed by the Westinghouse Electric & Mfg. Co. as consulting engineer.

Theodore N. Ely, chief of motive power of the Pennsylvania railroad, retired from active service on June 30, under the pension rules of the company. This position will in the future be abolished and the office of chief mechanical engineer will take its place, to which position A. W. Gibbs, general superintendent of motive power of the Pennsylvania lines east of Pittsburg, has just been appointed.

Obituary

William U. McGee, superintendent of the Chicago plant of the Griffin Car Wheel Co., died June 26.

William Richard Brixey, founder of the Kerite Insulated Wire & Cable Co., died at Seymour, Conn., June 9. He was born in England in 1851.

Harry P. Field, formerly secretary and treasurer of the Celfor Tool & Mfg. Co., of Chicago, died in that city last week, after a long illness. He was originally in business in Louisville, Ky., removing to Chicago in 1900.

Augustus W. Mott, vice president of the J. L. Mott Iron Works, died at the home of his father, Jordan L. Mott, in New York City, July 2, after a lingering illness from cancer, aged 50. He was the grandson of the founder of the Mott works, and was a member of various New York clubs.

Charles A. Hogue, an authority on hydraulic engineering and on pumping engines, died at his home in New York City, June 28. He was the author of several text books on the hydraulic branch of engineering science. He was a member of the American Society of Mechanical Engineers.

A Plant for Building Drilling Machinery

Being a Description of the New Works of the Cincinnati Bickford Tool Co., Erected at Oakley, Cincinnati's Machine Tool Suburb

With the completion of the new plant of the Cincinnati Bickford Tool Co., at Oakley, near Cincinnati, this suburb takes rank with the leading machine tool manufacturing districts of the country. These works have been designed for the rapid and economical production of metal drilling machinery and the various departments have been so arranged to insure the continuous movement of the work, the raw material being received at one end and is shipped out at the other end of the plant in the form of finished product. The buildings are of brick and steel construction, the machine shop being 430 feet long and 160 feet wide. A ground plan of the plant is shown in Fig. 7 and it will be noted that a two-story office building has been built in front of the main building and contains the offices on the first floor and drafting room and pattern shop on the second floor. The machine shop is a one-story structure with a 14-tooth, saw-tooth roof extending east and west to the south and east bays, which are built independently of that section covered by the saw-tooth roof. The assembling floor is 18 feet high to the roof trusses, while the tool room and machine department is 14 feet high. The teeth in the roof are built at an angle of about 30 degrees facing south and are each 126 feet long. Metallic sash windows have been installed throughout the shop, with swinging sash in the upper parts of the windows.

The Oakley colony central power station furnishes heat, electric power, compressed air, water and fire protection for the shop. The heating system consists of coils attached to the walls and extending overhead, which is the system of heating adopted by all the plants at Oakley. Pipes, wires, etc., from the power station to the plant are laid in a concrete conduit. All of the electrical equipment is controlled from one switchboard and the wires to the motors throughout the plant are carried in conduits underneath the floor. Fire protection is afforded by an overhead sprinkler system. In the machine department the tools are belt-driven from six line shafts operated by individual motors mounted on concrete pedestals about 5 feet high and arranged in a row across the width of the shop to reduce the distance between the motors for convenience in starting. The line shafts over the assembling floors are likewise motor-driven and furnish power for operating the machines that are being tested and for driving small tools used in fitting. In the assembling departments the motors are attached to the I-beam columns and there is approximately 1,800 feet of line shafting in the plant. The shafting operates in roller bearings. Raw material is received at the north end of the plant and passes through the various departments to the shipping room at the south. A track, depressed 4 feet, so that the car and shop floors are on the same level, extends into the receiving department a distance of 90 feet. At right angles to the receiving department is the raw material store room. From this department all raw material and small parts are issued and the cutting-off machines are located immediately outside of the store room to facilitate the delivery of material, as required, to the other departments of the shop.

Turret lathes and automatic screw machines are centered in one section adjoining the store room, as shown in Fig. 7, and as hand-reaming follows turret lathe work, a bench for the reamers is located near the lathes. Each hole is tried with a steel plug, and if the reamers are found to be below size, they are returned to the tool room for adjustment and grinding. The fixtures, tools and jigs are stored at various points throughout the shop convenient to the tools on which they are used. This saves time in handling and returning them to their respective racks. The engine lathes are located next to the screw

FIG. 1—A VIEW OF THE TESTING FLOOR IN THE HEAVY MACHINE AND ERECTING BAY

FIG. 2—VIEW IN ONE OF THE MACHINE DEPARTMENTS TAKEN AT NIGHT, SHOWING THE EXCELLENT ARTIFICIAL LIGHTING FACILITIES

machine and turret lathe section, and two lathes are used exclusively for making bronze bushings. Small parts are taken from the lathes to the grinding department and those that are not to be ground are sent to the polishing department, which adjoins the small engine lathe section. The keyseaters, broaching, gear-cutting and milling machines are in the center of the shop. Heavy lathes, large grinding machines, boring and facing mills, planers, etc., are located in another section, which parallels the heavy machining and erecting department. The drilling section extends across the shop at right angles to the various assembling departments. The tool room occupies a space 56 x 48 feet and is enclosed by a counter which also serves as a rack for small tools. The tool room is well equipped with grinding machines, lathes, drill presses, etc., and also contains two benches, one for making and adjusting small tools and another for making jigs, fixtures and boring bars.

Assembling Departments.

At the south end of the shop are located the assembling departments and finished store room. In the first two bays light upright drills are assembled and tested and in the third bay heavy upright drills are assembled. The testing of these drills is done in the second bay. Radial drills are assembled on the unit plan in bays Nos. 4 to 7, inclusive, as shown in Fig. 7. In the fourth bay the heads and feed boxes for the upright drills and the speed boxes for the upright and radial drills are assembled. In the fifth bay, universal heads for radial drills and heads for large plain radial drilling machines are assembled, while in the sixth bay, small radial drills, heads and back gear brackets for large

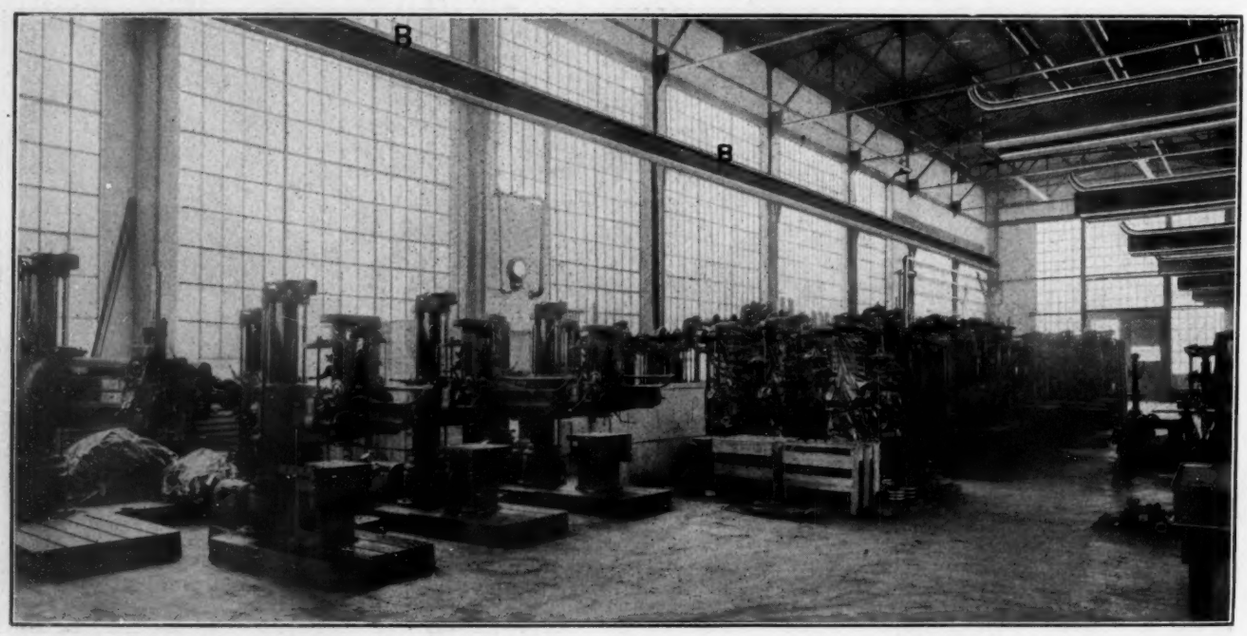


FIG. 3—A VIEW OF THE FINISHED STORE ROOM, WHICH SHOWS THE PROJECTING ENDS OF THE ASSEMBLING BAY CRANES AT *A* AND *B* IS ONE OF THE RUNWAYS FOR THE CRANE SERVING THIS DEPARTMENT

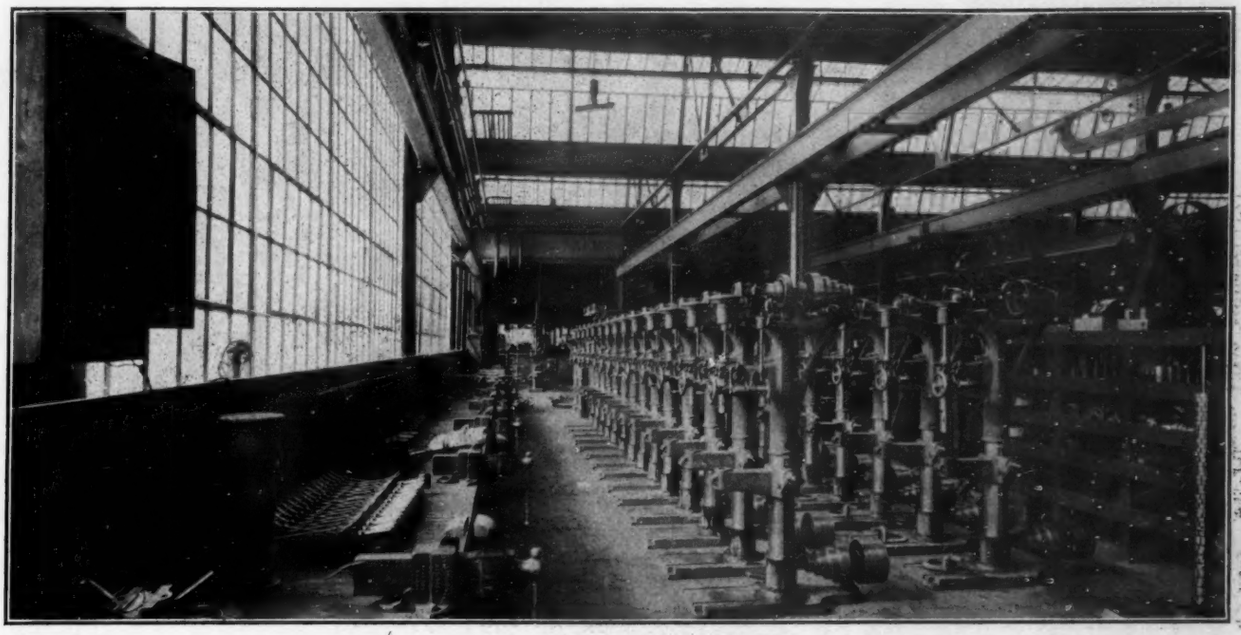


FIG. 4—LIGHT UPRIGHT DRILL ASSEMBLING DEPARTMENT

radial drills are assembled. The assembling of small radial drills and the fitting of tables for the large radial drills is done in the seventh bay. In this bay the small radial drills are also tested, being driven from the line shaft which extends the length of this department. All of the assembling departments are served by cranes for delivering the finished machines to the store room, which extends the full width of the building. This bay is 33 feet high and the 10-ton electric crane which commands this department, operates on a runway above the runways of the smaller cranes on the assembling floors. By this arrangement the finished tools are delivered to the store room floor by the assembling department cranes, within easy reach of the large store room cranes. The crane tracks from the assembling departments extend into the store room bay a distance of 8 feet. The crane is of sufficient height to provide a clearance vertically over the machines in the store room when a tool is carried above them by the 10-ton crane.

The heavy machine and erecting department is located in the east side of the shop and is 35 feet wide and 27 feet high. In this department all of the heavy castings are machined. The equipment consists of a lathe for turning heavy drill columns and sleeves, a boring mill for large castings, two planers and a number of large radial drills. Machines of large size are likewise tested and assembled in this section. This bay is served by a 15-ton Pawling & Harnischfeger traveling crane with a runway extending into the packing and shipping department to facilitate the loading of large tools directly into cars. The packing and shipping department is 90 x 35 feet and facilities have been provided

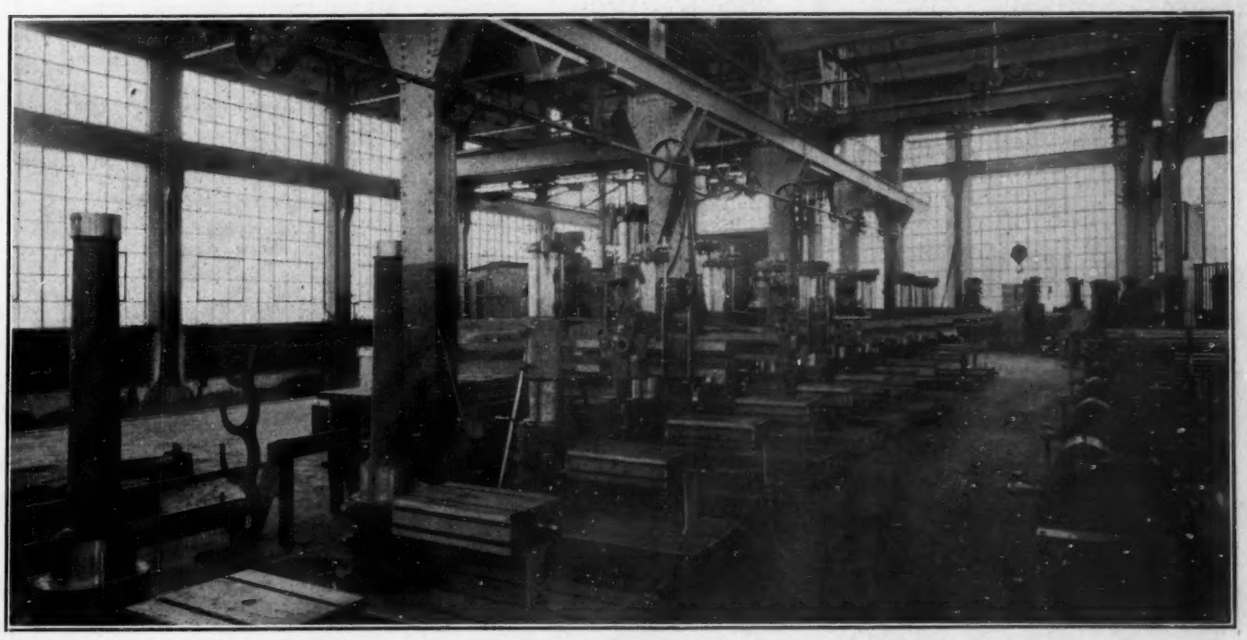


FIG. 5—BAY NO. 7, WHERE SMALL RADIAL DRILLS ARE ASSEMBLED AND TESTED; THE SHIPPING DEPARTMENT IS SHOWN AT THE LEFT

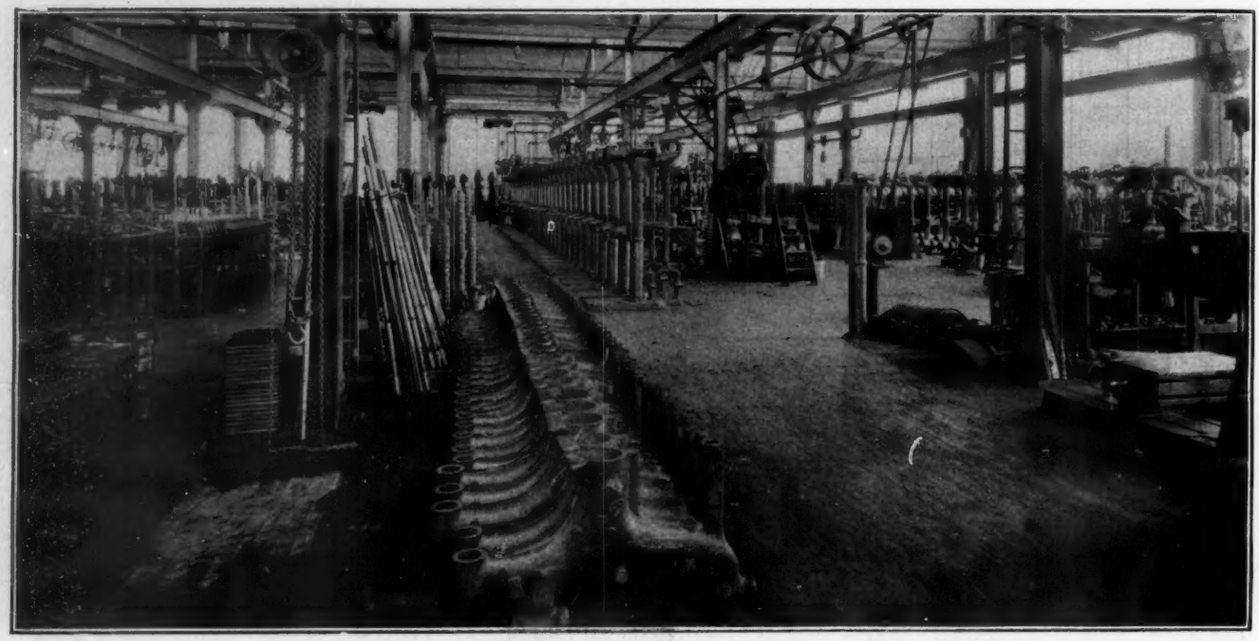


FIG. 6—ANOTHER VIEW OF THE ASSEMBLING DEPARTMENT, SHOWING BAYS NOS. 1, 2 AND 3

for loading two cars at a time. The track into this section is depressed 4 feet, the car and shop floors being on a level. The scale in the shipping department is commanded by both a 15-ton crane which serves the heavy machinery and erecting building, and a 10-ton crane which commands the finished store room, thus making it convenient to weigh the machines from either department before shipment. The carpenter shop is located outside of the main building, directly opposite the store room. It will be noted that both the receiving and shipping tracks only extend into the building a short distance and by this arrangement considerable floor area is available for manufacturing purposes, which would not be the case if the tracks had been extended through the entire shop. When operating at capacity, approximately 500 men are employed.

The floor throughout the shop is made of 3-inch pine plank laid on sleepers set into a 5-inch layer of tarred concrete and covered with a layer of 7/8-inch maple. The location of every machine was laid out in detail before the size and general arrangement of the building was finally determined.

For lighting the shop 91 mercury vapor lamps, spaced at regular intervals, have been installed. A view

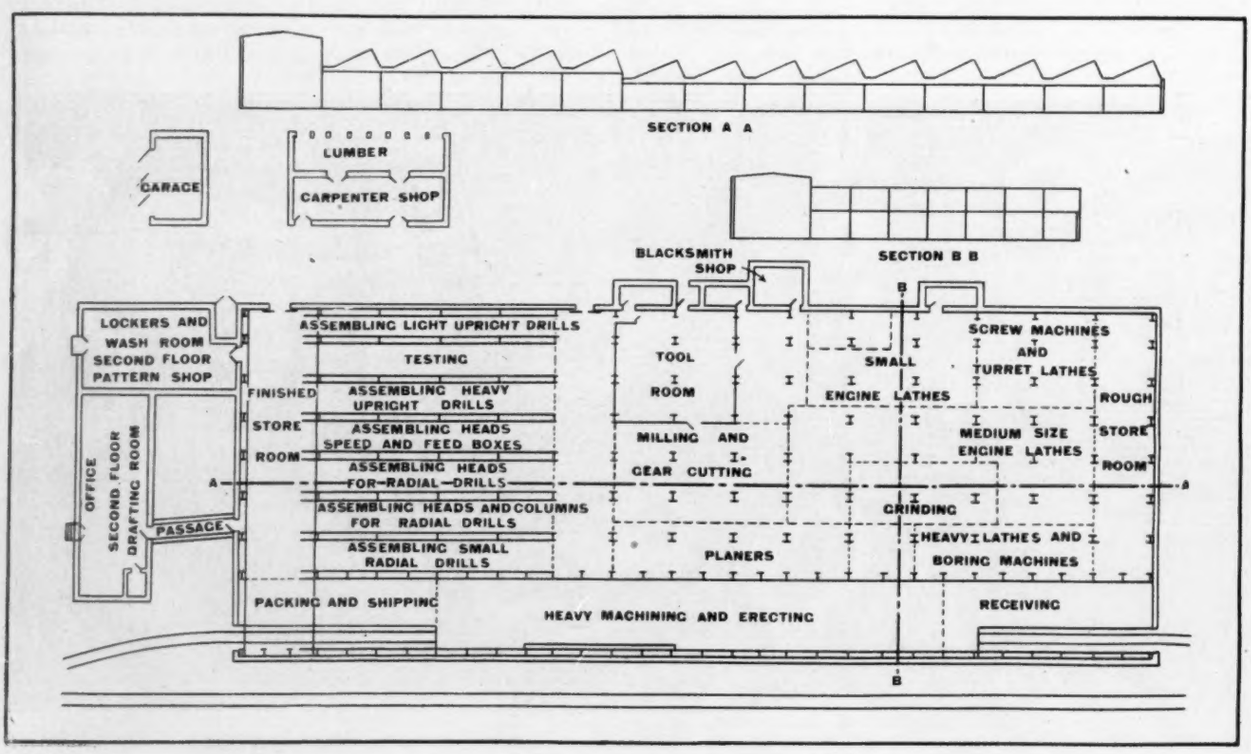


FIG. 7—GROUND PLAN AND SECTIONAL ELEVATIONS, SHOWING THE ARRANGEMENT OF THE CINCINNATI BICKFORD TOOL CO.'S PLANT

of the machine shop, obtained from a photograph made at night, is shown in Fig. 2. This clearly illustrates the almost entire absence of deep shadows. Forty single-tube lamps are installed in that section of the machine department which is only 14 feet high and these are hung at an average height of 12 feet above the floor. The remaining lamps are of the double-tube type and have been installed in the other machine department at an average height of 18 feet above the floor. The small lamps are arranged to illuminate about 780 square feet of floor space, while the larger lamps illuminate 935 square feet of floor space. When laying out the lighting system, a 5 x 8-foot shop floor plan, showing the machine layout, was used and an effort was made to so arrange the lights as to insure the illumination of each tool without shadows.

The Iron Ore Deposits of Swedish Lapland

Eastern Blast Furnaces Are Now Importing a Large Tonnage of This Ore, Which is Rich in Iron Content—Mining Operations

Early in March, 1909, the Norwegian steamer Hero, from Narvik, Norway, arrived at the Port Richmond docks, Philadelphia, and discharged a cargo of 6,000 tons of Swedish ore for delivery to the Reading Iron Co., Reading, Pa. From this beginning. Swedish ore became an important commercial factor in the iron and steel industry of this country—directly so in the case of eastern pig iron manufacture—and the mines of Lapland took the position of one of the leading foreign sources of supply for the blast furnaces of the United States, located along or adjacent to the Atlantic seaboard.

Almost simultaneously with the docking of the first cargo, Dr. Hjalmar Lundbohm, general manager of the Loussavaara-Kurunavaara Aktiebolag, of Stockholm, arrived in this country and in a few weeks negotiations had been closed with eastern furnaces for the sale of about 170,000 tons of this ore. These contracts included 80,000 tons to the Reading Iron Co., Reading, Pa.; 25,000 tons to the Warwick Iron & Steel Co., Pottstown, Pa.; 12,500 tons to the Empire Iron & Steel Co., Catasauqua, Pa.; 12,500 tons to the E. & G. Brooke Iron Co., Birdsboro, Pa.; 10,000 tons to J. J. Mohr & Co., Philadelphia, for the Musconetcong Iron Works, Musconetcong, N. J.; and about 30,000 tons to the Richard Heckscher & Sons Co., Swedeland, Pa. In the fall of 1909, sales of 310,000 tons additional were negotiated, and the great bulk of this tonnage has already been imported, so that its delivery will have been completed before the expiration of July of this year. The Bethlehem Steel Co., South Bethlehem, Pa., has recently closed for a large block of this ore for delivery over a term of years, and this purchase is the largest transaction in Swedish ore ever made with the iron and steel manufacturers of this country. Other sales, this year, to date, have been confined to single cargoes and of the three of these transactions made, two lots have already been delivered. Up to June 1, the total shipments of Swedish ore to this country in a period of slightly more than two years have been about 450,000 tons. Approximately 200,000 tons of this ore has gone to the Reading Iron Co. These sales have been negotiated either by Dr. Lundbohm on his visits to the United States, or by Albert Broden, superintendent of the blast furnace department of the Reading Iron Co., who represents the Loussavaara-Kurunavaara company in its ore trading in this country.

Eastern furnace operators have been attracted to the Swedish ore by its rich iron content, which averages from 66 to 68 per cent metallic iron. Of 32 cargoes of ore received by the Reading Iron Co. in the past two years, the lowest iron content was 66.115 per cent, and the highest 68.175 per cent; phosphorus was lowest at 0.103 per cent and highest at 0.295 per cent. The moisture was lowest at 0.031 per cent and highest at 1.146 per cent, and in only two cases did it exceed 1 per cent. Sulphur and manganese in the ore was practically negligible. In price, Swedish ore has commanded the highest figure per unit of iron of any of the non-Bessemer foreign ores frequently sold in this country. The original sales in 1909 were made at 8 cents per unit of iron, f. o. b. cars Philadelphia, subject to

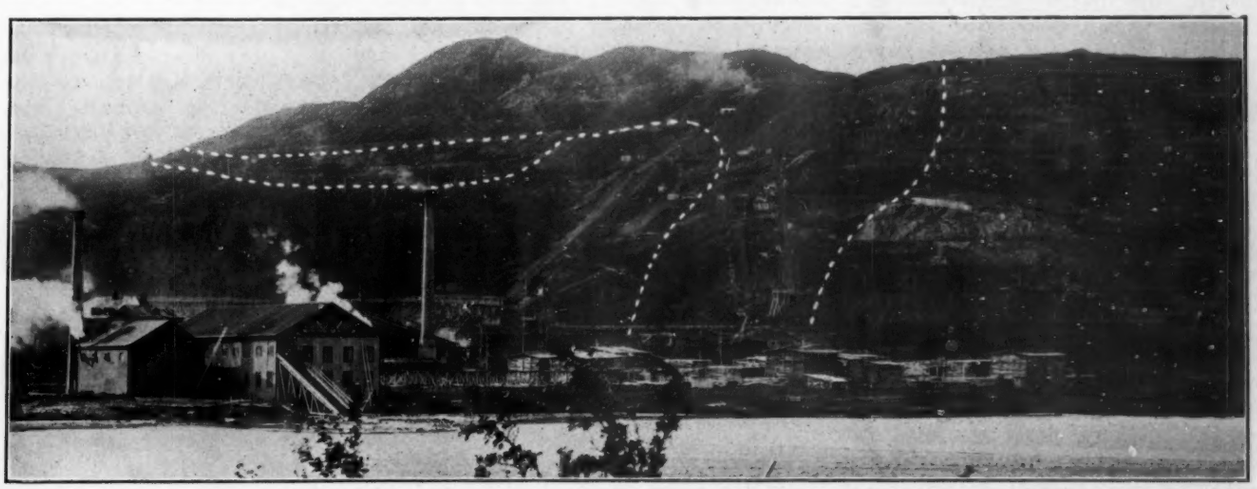


FIG. 1—VIEW OF THE KURUNAVAARA IRON ORE MINES IN SWEDEN; ACTIVE OPERATIONS ARE CARRIED ON ABOVE AND BETWEEN THE DOTTED LINES

a division in the then uncertain duty, which was subsequently lowered from 40 to 15 cents per ton, and the buyers received a partial benefit of this reduction in the imported cost. In 1910, the 8½-cent per unit price, Philadelphia, prevailed, and the scattered cargoes which have been sold this season were disposed of on the same basis.

Ores of the Kuruna District.

The eastern blast furnaces of the United States, which have been using Swedish ores in their mixtures, are drawing their supplies largely from the rich magnetite ores of the Kuruna districts in Swedish Lapland, the principal operation of which is the Kurunavaara mine. The Kuruna ores are the leading exported ores of Sweden; in fact, only a small fraction of the output of the district is used for home consumption. The iron and steel industries of Germany, England, Belgium and France, in addition to the United States, annually consume large blocks of this ore. Shipments to the United States are made principally from the port of Narvik, Norway, which is open for navigation the entire year, and deliveries are made at Philadelphia. This is the most direct and convenient route. The other principal shipping port from Swedish Lapland is Lulea, on the Gulf of Bothnia, but this is closed to navigation in winter. The Kurunavaara mines are 105 miles by rail from Narvik and 190 miles from Lulea. The freight from the Kuruna district to Narvik is $1.08 a ton, making the total cost of the ore to the mining company at this shipping point, including royalty, about $2 a ton. The Gellivare deposits are 132 miles from the port of Lulea by rail. The freight is 75 cents a ton, which, with the mining cost and royalty, makes the total cost of about $1.50 a ton at this port. The Loussavaara-Kurunavaara Aktiebolag, which sells the Kuruna ore in this country, controls its own fleet of ore boats and consequently is not affected by the sharp fluctuations in ocean freights which sometimes interfere with the trans-Atlantic ore-carrying to the eastern coast.

The Swedish government has adopted various measures for the safeguarding of its ore resources of Lapland and other sections, with the view of prolonging the working of the mines so as to permit the establishment of permanent industries that will contribute to the general prosperity of the nation. One of these, which is of much importance in determining the extent of the operation and development of the properties, is the fact that the state reserves one-half interest in all ore bodies discovered within its boundaries. In the northern provinces, large tracts of land are being held by the state and no mining claims upon them are granted. The government has also placed a fixed limitation upon the amount of ore that may be exported. In the case of the Gellivare mines, this total has been placed at about 19,000,000 tons and from Kurunavaara, at about 75,000,000 tons for a period of 25 years to 1933. There is an agreement between the government and the operating companies whereby the stock of the latter may be taken over after 25 years, under certain stipulations. The government receives no dividends upon its shares in the mining companies, but realizes its bounty in the form of royalties. In the Gellivare mines the royalty is 27 rents a ton on the ore mined.

The shipments of magnetite ore from the mines of Swedish Lapland during the past year are estimated at about 3,500,000 tons, compared with about 2,250,000 tons in 1909, and about 2,750,000 tons in 1908. The decrease in the production of 1909 over 1908 was due to labor troubles, which caused a general suspension of operations for two months and a half of that period.

In Swedish Lapland, four mines are now being operated. Two of these in the Gellivare district are owned respectively by the Grangesberg-Oxelosund Co. and the Bergverksaktiebolaget Freja; in the Kuruna district, the remaining two mines are the Kurunavaara mine, of the Grangesberg company, and the Tuolluvaara, of the Tuolluovaara company.

The Gellivare District.

Magnetic ores form the principal output of the Gellivare district and the annual production of these grades is estimated at about 1,200,000 tons, the greater portion of which represents the output of the Grangesberg company. A single mine, the Kos-

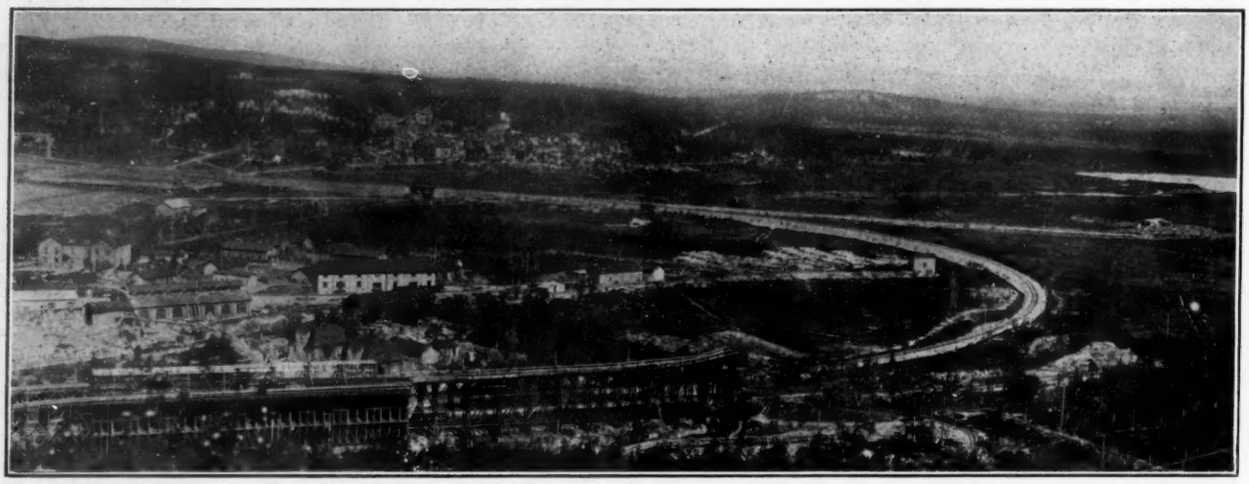


FIG. 2—ORE POCKETS AND TRESTLE AT KURUNA FROM WHICH THE ORE IS UNLOADED INTO CARS

kullskulle, which is located on the eastern end of the ore belt, constitutes the operation of the Freja company. Its annual output is about 250,000 tons. The ore outcrops along a ridge, the highest points of which are about 900 feet above the lowlands. Some of these outcroppings are from 50 to 200 feet in width and up to 3,000 feet in length. The mines are worked as open quarries, some of which reach a depth of about 150 feet. The ore is broken down in benches. From the bottom of the workings the ore is run out on tunnels on the same level, or is sent down through a shaft sunk in the ore to a tunnel below the quarry level. The methods of working and conveying the ore are similar to the usual quarry practice in this country. Underground mining is being followed at the Tingvallskulle mine on the eastern end of the belt. Three main levels, 50 feet apart,

driven parallel to the deposit, are to be mined. These will be reached by entries run from the side of the ridge. Owing to the width of the ore body, which runs to 250 feet in some places, it has been decided to adopt the system of overhead stoping with storage of the ore. From the main levels a series of haulage tunnels are driven across the ore from the foot to the hanging side. These cross tunnels are driven in the pillars and afford entrance to each end by means of a ladder-way to the rooms, which are carried about 25 feet wide across the ore body, beginning at the hanging side. The pillars between the rooms are about 30 feet wide. The bottom of the room is slightly below the level of the cross tunnel so that the ore can be drawn out through the chutes, leading into the tunnel at every 15 feet. It is the intention to carry the rooms up from one level to the other, a height of 160 feet. Only enough ore will be withdrawn from the rooms during stoping to afford room for the miner who stands on the ore as he breaks down the room. Light hammer drills, weighing about 20 pounds, are generally used in the underground work.

The iron content of the Gellivare ores runs from 60 to 68 per cent, with an average of about 65 per cent. Material carrying less than 60 per cent is not shipped. Hand sorting and cobbing of the material is done in the workings and the lean ore sent to stock piles to await future concentration. It has been planned to install a concentrating mill at the Tingvallskulle mines, which will be equipped with magnetic separators of the drum type. A central power plant of 3,000 horsepower, equipped with steam turbines, furnishes power for the mines. English coal is used. On the Lulea river there is now being developed a hydro-electric plant which at some future time will supply power for the Gellivare, Kurunavaara and other mines, as well as the railroads. The cost of mining in the Gellivare district averages from 50 to 75 cents a ton.

In the Kuruna district, there are three large magnetite deposits, Kurunavaara, Loussavaara and Tuolluvaara, which are considered the largest accumulation of magnetic iron ore ever discovered. The ores of the Kuruna district are in marked contrast to the Gellivare magnetite and from the magnetites in general. They lack the usual granular or crystalline appearance of other magnetites and are very dense and massive. The only gangue material is apatite, which is so irregularly distributed and mingled with the ore that its mechanical separation is very difficult.

The problem in the mining of these ores involves the production of a uniform material because the rock varies widely in phosphorus. Special systems have been adopted for maintaining uniformity in the product shipped. Samples are taken from the different benches on which work is being done, are assayed and the percentage of phosphorus carefully tabulated. The ores are classified according to their phosphorus content, with the result that five or six different gradings are made and these are transported in separate cars to the port of Narvik, where extensive facilities for handling the ore are provided. The sampling plant at Narvik is ingenious and is so arranged that the whole stream of ore being spouted into the ship from the ore pockets may be diverted for a part of the time. This arrangement consists of a movable hopper swung upon a horizontal axis, which swings above two other hoppers, one of which directs the ore from the hopper above to the ore bin and the other hopper receives the portion of the material which is taken for assay. The movable hopper is operated by an arm and a lever. This lever carries a friction wheel resting on a revolving wheel, a part of the circumference of which is flattened. When the flattened part comes in contact with the friction wheel, the lever is moved quickly, bringing the movable hopper over the hopper, which receives the ore sample. This continues for a short period, until the revolutions of the wheels have passed the flattened part, causing the movable hopper to switch back over the hopper leading to the ore bin.

The shipments of ore are first sam-

FIG. 3—CHARACTER OF THE ORE IN THE KURUNAVAARA MINES; THE METHOD OF MINING AND TRANSPORTING THE ORE IS ALSO SHOWN

pled on the car by taking a grab sample amounting to about one-half of 1 or 1 per cent of the whole load. This, in the case of a cargo of 7,000 tons, amounts to about 35 tons. The grab sample is crushed to about ½ inch, and then is delivered to the first sampling machine, which removes about a ton as sample. The latter is crushed again in a mill and is delivered to another sampling machine, where a corresponding reduction is effected. A small machine then cuts the sample down to one pound lots, which readily can be assayed.

Quarry methods of mining are employed at Kuruna, but since the ridge is practically all ore-bearing rock, it is cut down in a series of benches. head of the inclines, extending to the first or second series of benches. From the loading pockets in the shafts, the ore is loaded into cars, and these are then lowered down the mountain by a gravity system, in which the loaded cars pull up the empty wagons. At the bottom of the inclines, the cars run out over trestles and the ore is dumped directly into railroad cars or into storage pockets. No machinery is employed at present for loading ore at the working faces, though there is one steam shovel for stripping the rock. A form of self-dumping ore car is used on some of the inclines.

It is estimated that the production of the Kurunavaara mine in 1910 was

FIG. 4—MAP SHOWING THE LOCATION OF THE IRON ORE DEPOSITS OF SWEDEN AND SHIPPING PORTS

The mountain of ore is about 500 to 600 feet above the plain and has a length of nearly two miles. At one point a thickness of about 550 feet of ore has been measured, but the average is about 250 feet. The principal work now being carried on is at the northern end of the ridge, where the hanging side of the deposit is being blasted away and the ore is attacked by extending a series of benches along the course of the deposit, as shown in Fig. 3. These benches are about 50 feet apart. The ore is loaded into cars by hand and is hauled by horses to shafts sunk in the ore body, where it passes to the about 2,300,000 tons, compared with 1,383,686 tons in 1909 and 1,649,850 tons in 1908. A few miles east of Kurunavaara, lie the Tuollovaara deposits, yielding very desirable low-phosphorus ores. The production of the Tuollovaara mine is about 100,000 tons annually. Some of these ores are as low as 0.007 per cent in phosphorus and those lowest in this element are used exclusively in Sweden. The largest deposit which is now being actively worked is about 100 feet thick at its widest part. The ores are of a fine granular texture, strongly contrasting with the dense magnetite of the Kuruna district. The ore is mined by the open pit method and the motive power is transmitted from Kuruna. The Luossavaara deposit, which is of an extent and is in such a condition as to produce a very large tonnage of magnetites without much preliminary development, is not operative at the present time.

The ore-handling facilities at Narvik are very extensive. Improvements are now under way which will greatly enlarge this plant. The ultimate purpose is to load the ore from the cars directly into the ships, but a storage capacity for about 800,000 tons in the yards will be provided when the improvements are completed. For direct shipment from the mines, the trains are run onto a loading dock, which is of sufficient size to accommodate three steamers at a time. The side-dump cars discharge into ore pockets below the trestle and from these pockets the ore is run through spouts into the steamer's hold. An electric winch, which runs on a track parallel with the cars, raises and lowers these spouts. A series of weights, automatically counterbalance the spouts. The rapid discharge of a train load of ore is possible by this system. A recent unloading record involved the discharge of a train load of 800 tons of ore into a ship's hold in about six minutes.

Mines of Central Sweden.

Though the Kuruna and Gellivare districts constitute the principal Swedish iron ore deposits now in commercial operation, there are numerous other mines in central Sweden, some of which are now being operated. The general character of these deposits differs widely from those of Lapland, since they are associated with a variety of crystalline rocks, compared with the formations enclosing the ores of northern Sweden, and only in rare instances do they equal the richness of the latter. As a rule, sorting and hand cobbing must be resorted to with these central Sweden ores and there is much lean material that can only be utilized after concentration. The magnetites are generally low in phosphorus. Such ores are seldom sold in the open market, but are shipped to local charcoal blast furnaces, which in some cases are operated in connection with the mines. The low phosphorus ores of central Sweden are in a special class by themselves and their mining is carried on under conditions that do not apply to the higher phosphorus ores.

The Grangesberg deposit is a very large body of phosphetic ores and the mining methods here employed are similar in general nature and thoroughness to those of northern Swe-

den. The Grangesberg deposit is the largest in Sweden and Lapland, and its present output is about 500,000 tons of lump ore and concentrates a year. It has been estimated by the company's engineers that this property has in reserve approximately 50,000,000 tons. The ore is chiefly a fine grained magnetite, but there is considerable hematite in some of the deposits, of which the Export pit is the largest. This pit is 1,300 feet long, 225 feet wide and 350 feet deep. The shipping ore, after hand sorting, carries about 60 per cent iron and about 1 per cent phosphorus. Most of this ore is exported, Germany taking the greater part of the output. About 80,000 tons are consumed annually in Sweden. Three methods of mining are followed in the Grangesberg deposits, open pit mining, overhead stoping with storage and caving. The open pit method is mainly used at the Export mines. The system of overhead stoping and storage of the ore at Grangesberg is similar to that followed at Gellivare. The levels are 100 to 150 feet apart and the ore is extracted in rooms 25 feet wide, with pillars of the same width separating the different rooms. After the ore has been taken out, the pillars are mined by sub-levels driven into them and by caving. The cross cuts are run directly under the rooms rather than the pillars, as is done at Gellivare. The ore, as hoisted from the mines, is separated from the fine particles and the heavier material passes on to a sorting belt, where the waste rock is removed. The fine ore is conveyed to a magnetic cobber. A large mill for treating the low grade material has recently been installed.

Ore Concentration.

At Floberget concentration is carried on by the Grondal process. From nearby mines about 150 tons of ore are treated every 24 hours and about 60 tons of concentrates are produced. After the magnetic material is reduced, it is passed through Grondal cylinder separators, the excess water is removed by settlers and it is then passed to the briquetting plant. The fine ore contains about 18 per cent sulphur and this is reduced to 0.008 or 0.010 per cent in the kilns. The briquettes contain about 0.003 per cent of phosphorus .

The Dannemora group of mines in central Sweden has an output at present of about 60,000 tons a year of ore averaging from 50 to 55 per cent in iron. The ore is taken out in chambers. The cost of operation is relatively high, which is compensated for by the low phosphorus content of the ore and the fact that the Dannemora grade of pig iron has long had a fixed market. In the Norberg district there are a number of mines of different character operated by various interests. A number of these are under the management and direction of the Norberg Co. The production of the district exceeds 100,000 tons a year, made up of several grades. . These include siliceous ore, which most commonly abounds, running about 50 per cent in iron and 0.02 per cent in phosphorus; lower silica ores with a higher lime content and consisting largely of magnetite and high manganese magnetite. The workings are underground and the ore is taken out by the room and pillar method. The ore as mined is sorted, the fine material being picked over by women and children, who first wash out the dirt with screen boxes, in which the material is submerged in water. For the second class of ores, largely magnetic in character, a concentrating mill is used, which has a capacity of 150 tons of crude ore per day. The average iron content of the milling ore is 35 to 40 per cent and the concentrates carry 62 per cent iron. Fine crushing is necessary, owing to the dense character of the ore and the close association of magnetite and gangue. In addition to these various districts outlined, Sweden has within its borders some very large deposits of titaniferous iron ores of little proven commercial value.

Equipment of Air Furnaces Using Oil as Fuel[1]

By W. N. Best

Many attempts to burn liquid fuel in air furnaces have failed because of the operator not being able to melt the full charge or to get the metal as hot as when burning coal. Often the charge was oxidized to such an extent that what metal did become molten was practically worthless. Usually, a number of burners, each giving a round flame, have been placed in the side wall of the furnace, and as the number of burners was increased, the equipment became more and more intricate. Something had to take the blame for the wasted time, material and effort, so oil was condemned as being unworthy of further consideration.

Let us consider the ultimate analysis of the average gas coal used in air furnaces and fuel oil. This coal contains 70 to 75 per cent carbon, 4.5 to 6 per cent hydrogen, 10 to 18 per cent oxygen, 1 to 2 per cent nitrogen, and 0.5 to 1.5 sulphur. The calorific value is from 13,500 to 15,300 British thermal units per pound.

The analysis of residium or fuel oil follows: Carbon, 84.35 per cent; hydrogen, 11.33 per cent; oxygen, 2.82 per cent; nitrogen, 0.60 per cent, and sulphur, 0.90 per cent.

The weight per gallon is 7.3 pounds and the calorific value ranges from 18,350 to 19,342 British thermal units per pound.

Advantages of Fuel Oil Melting.

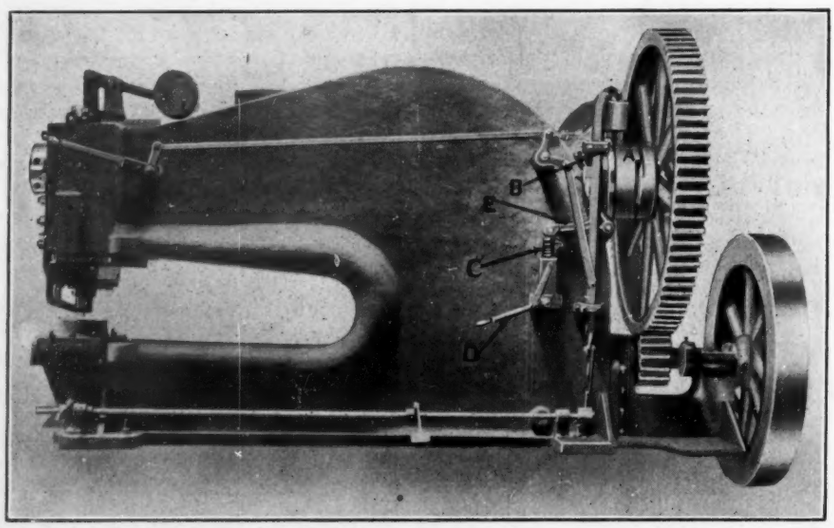
From this data, the natural conclusion is that oil, having a much higher calorific value than coal, should be able to melt the metal in a much shorter period than coal. Not only that, but it should also be able to bring the metal to the temperature required for even the smallest castings. It can do both if properly applied, and furthermore, the quality of the metal is improved, for by chemical analysis and numerous tests, it has been found that the castings contain no more sulphur than the metal did when charged into the furnace, and the tensile strength is consequently greater than of metal melted by coal fire.

As the melter has the furnace under perfect control, the heats can be taken off much quicker than when burning coal, and the temperature of the charge, while being tapped, can be maintained without varying more than 25 degrees Fahr., until the entire charge has been run from the furnace. The operation of skimming is materially decreased, a very noticeable improvement which is especially appreciated by the melter. The high calorific value of oil also enables the melter to estimate within a few minutes as to the exact time when the charge will be ready to tap, which is in striking contrast to conditions while burning coal, especially in rainy weather, when climatic conditions are unfavorable

[1]Presented at the Pittsburg convention of the American Foundrymen's Association.

and the stack draft is materially affected.

The change from coal to oil is a very simple matter. In the original firebox is constructed a combustion chamber of such form and proportions that the air necessary for perfect combustion can unite with the atomized fuel before it reaches the furnace, which prevents oxidization of the charge. Also, this chamber causes the heat to be deflected upon the entire surface of the bath. In the end of this combustion chamber is placed a hydro-carbon burner of peculiar form, which makes a fan-shape blaze, filling the entire chamber with flame. This burner exteriorly atomizes any gravity of liquid fuel which will flow through a ½-inch pipe, such as fuel oil, crude oil and tar. Its construction is such that it cannot carbonize, and there are no parts to wear away or get out of order. A very small quantity of compressed air is used through the burner to atomize the fuel and distribute the heat, while the balance of the air necessary for perfect combustion is supplied at from three to six-ounce pressure, through a volume air nozzle.



Boiler Plate Punch Equipped with an Automatic Stop Clutch

Economies of Oil Melting.

The furnace is charged in the usual manner. The burner is started by opening the air valve, holding a piece of burning waste, which has been well saturated with kerosene, by means of a pair of pick-up tongs under the burner and then turning on the oil. This burner is very simple to operate. In fact, it is so very simple that one must see it in operation to appreciate that as intense a heat can be obtained with it in a few minutes as from burning coal for several hours.

The reduction in the time required to get the charge ready for tapping is not the only point wherein oil is more economical than coal. There is no handling of fuel and ashes, consequently the services of the fireman and coal passers are dispensed with. There is great saving in floor space, for the oil tank is placed underground and the former coal bins are used for other purposes. The fire brick lining of the furnace lasts 20 per cent longer than with coal. Poor or imperfect castings caused by the metal being cold or sluggish, are obviated entirely, for with liquid fuel, the question is not how hot you can make the metal, but how hot do you wish it? All these items should be taken into consideration when comparing the relative costs of using oil and coal in air furnaces.

Strange to relate, the first air furnace which I ever tried to equip with my oil-burning system is located on the site where the first malleable iron was made in the United States, by Seth Boyden. The plant is now known as the Barlow Foundry Co., and is located at Newark, N. J. Mr. Barlow, president of this concern, had tried, on several previous occasions, to burn oil in his air furnace, but was not wholly discouraged because of his repeated failures and when a friend suggested that he let the author equip his furnace, he was willing to give oil another trial. A combustion chamber was built in the original firebox of his furnace on a Saturday afternoon more than a year and a half ago. On the following Monday, the first heat was tapped out in the usual manner and up to the present time the oil has never failed.

Several months ago, Geo. H. Graham, secretary and treasurer of the Oriskany Malleable Iron Co., Oriskany, N. Y., visited the Barlow Malleable Iron Works and was so impressed with what he saw there that he has equipped his air furnace with oil burners.

For melting semi-steel, the oil-fired furnace can be used to advantage. The steel and pig iron can be melted in this furnace and can either be run into castings or into pigs to be used in the cupola whenever desired. When metal is melted in a cupola, it absorbs the sulphur contained in the coke, but in an oil-fired furnace of proper construction, the sulphur contained in the fuel is absorbed in the combustion chamber before it reaches the bath of the furnace.

Punch Equipped With Automatic Stop Clutch

In the accompanying illustration is shown a single end boiler plate punch equipped with an adjustable automatic stop clutch, recently built by the Queen City Punch & Shear Co., Cincinnati, for the Quinlan Boiler Co., Indianapolis. The throat of the punch is 66 inches and it has a punching capacity up to and including a four-inch hole in one-inch steel plate. The stop clutch, *A*, is provided with a disc, *B*, which carries two adjustable circular cams on opposite sides of the disc and on alternate sides of its circumference. A coiled spring, *C*, is compressed by the revolving cam through the belt crank lever, *E*, at the end of each stroke of the punch. At the same time the clutch is forced out on the cam on the outer side of the clutch disc. A toggle stop in back of the top of the belt crank then closes, holding the coiled spring in compression until it is pulled up by operating either the hand punching lever or the foot treadle. The movement of the treadle releases the spring which forces the clutch into place through the bell crank lever and operating cam. A safety lever, *D*, holds the clutch open and prevents it from being closed by the hand lever or foot treadle. The clutch is operated automatically and for punching material of varying thicknesses, the operating cams are made adjustable by rotating them around the driving shaft. These cams can be set at any desired angle with the head of the punch so that the punching stroke is finished and the punch is left at any distance above the anvil block. This is essential when using a four-inch die as it is impossible to center a thick plate with a punch of this size with the same clearance between the punch and block as for a plate one-half this thickness. The punch is driven by a 20-horsepower motor and the machine weighs 4,500 pounds.

The Citico Furnace Co., Chattanooga, Tenn., blew out its stack on June 17.

Mechanical Equipment for Charging Cupolas[1]

A Discussion of the Economies Effected by the Use of Mechanical Charging Devices — Ideal Arrangements of Charging Floors

By G. R. Brandon

It is evident from the interest aroused in methods for reducing the cost of handling cupola stock that this subject is considered of great importance by foundry managers. There is no department in the foundry, in which greater returns will result from the adoption of a scientific plan of operation. Every movement, from the time the stock arrives in the yard until charged into the cupola must be carefully studied, and facilities provided to eliminate manual labor wherever possible and make this labor most effective when necessary to be depended upon.

I will consider first the layout of the storage yard and means for handling the stock. Assuming a foundry of moderate capacity, for which ample ground for an accumulation of stock will be provided, materials should be delivered on cars on a railroad switch track running parallel to the length of the foundry on the side where the cupola house is located. The distance between the foundry building and this track should allow space for storage adjacent to the railroad switch and for a narrow gage yard track between the storage piles and the building. It is evident that the layout of the stock yard will depend upon local conditions, but the principles here given will be applicable in any plant.

Pig iron should be piled in the yard, with a label on each pile, giving brand and grade of iron, also initial and number of car on which the iron was received. A good plan is to mark the pigs near the bottom layer of the pile, which will not be disturbed until the pile is nearly used. From the car records the analyses and complete information regarding the particular carload should be obtainable. Scrap iron is simply dumped into bins, different grades being kept separate. Coke should be stored in covered bins. When the tonnage handled is sufficient to make the investment profitable, a traveling or gantry crane, covering the storage yard, should be installed. It should have high speed movements and should be fitted with a magnet for unloading pig and scrap, and for manipulating a drop weight for breaking the scrap. This crane should also be used for handling heavy flasks in and out of storage, and for loading castings to be shipped. The crane may be fitted with a grab bucket to handle coke and limestone. A jib crane may be substituted for a traveler in a smaller plant and will perform similar functions, to a limited extent.

Disregarding the primitive methods still occasionally employed, of using barrows and dumping stock on the charging floor to be rehandled in making up charges and again for charging into the cupola, I will briefly review various modern methods of handling cupola stock from yard to cupola. Charges should be collected on cars, the proper amount of different grades being selected and weighed and not again handled until introduced into the cupola. Cars of two tons capacity, properly constructed and equipped with roller bearings, can easily be pushed over level tracks by one man. When warranted by conditions, an electrically operated transfer car may be used to transport charging cars while charges are being collected. A scale may be mounted on a transfer to weigh charges, if desired. After the charges are weighed, cars are elevated to the charg-

[1]Presented at the Pittsburg meeting of the American Foundrymen's Association.

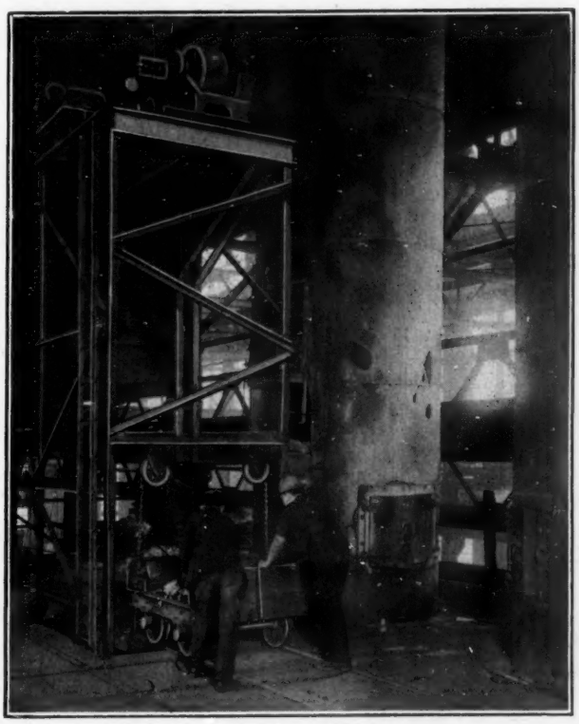


FIG. 1—ELECTRICALLY-DRIVEN CUPOLA CHARGING MACHINE BEFORE CAR IS ELEVATED FOR DUMPING

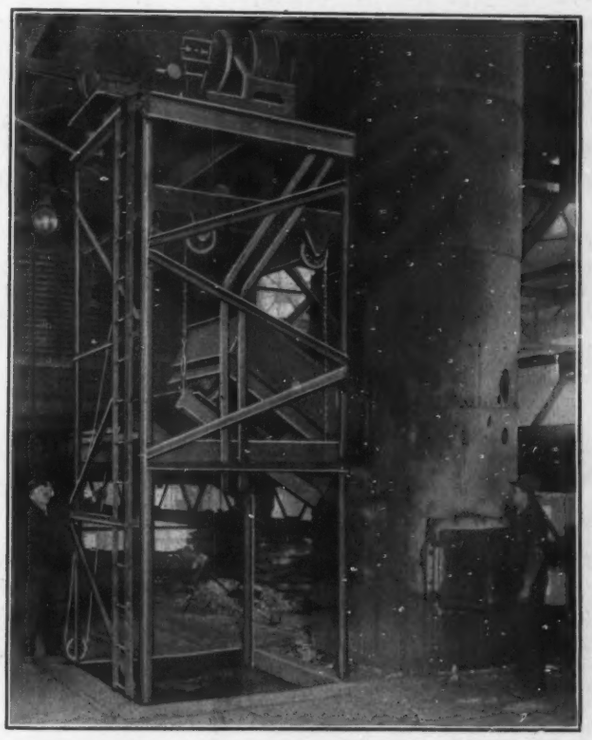


FIG. 2—ELECTRICALLY-DRIVEN CUPOLA CHARGING MACHINE SHOWING CAR ELEVATED AND DUMPING THE CHARGE INTO THE FURNACE

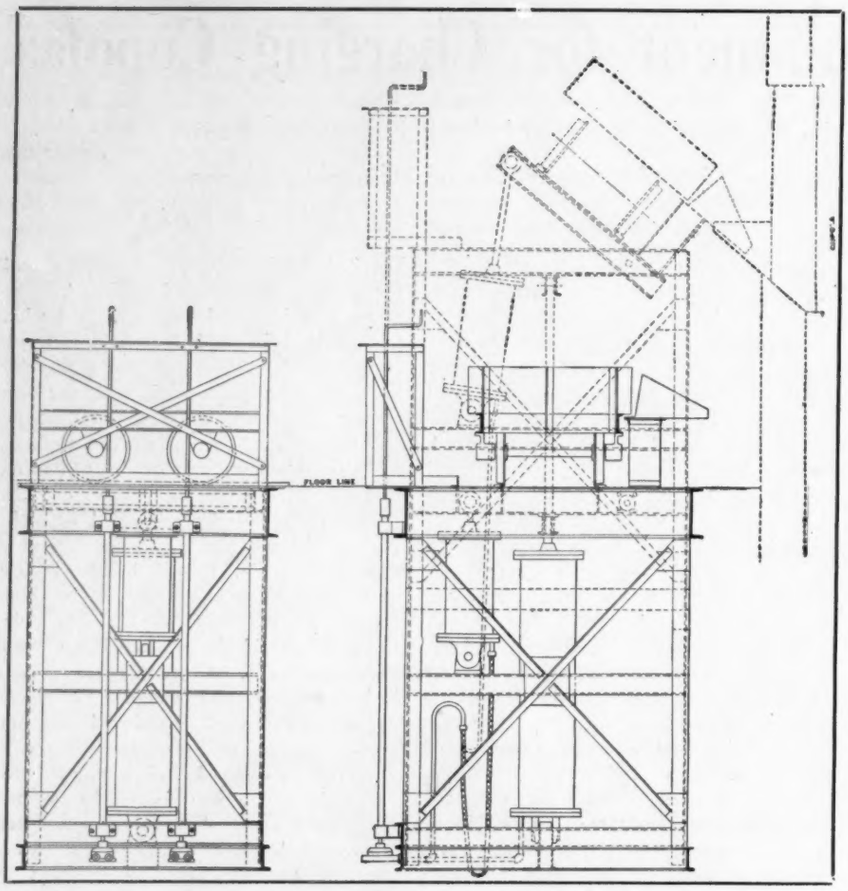


FIG. 3—COMPOUND CUPOLA CHARGING MACHINE IN NORMAL AND DUMPING POSITIONS; POWER IS FURNISHED BY A PNEUMATIC CYLINDER HOIST

ing platform by means of an elevator, or if the yard crane is available, cars may be constructed with means for attaching slings, and the car with charges lifted intact to the charging floor, but this latter method is not an economical one and is only permissible in case of accident to the elevator. Iron and scrap may be elevated to the charging floor with a magnet crane, but this method requires additional space on the charging floor and involves extra handling.

Storage space for about 50 per cent of the metal for one heat should be provided for on the charging floor and a sufficient number of cars to carry this stock must be supplied for convenience and economical operation. As soon as emptied, cars are lowered to the yard and charges replenished for a later period in the heat. A system of tracks on the charging floor should provide for the constant forward travel of cars and an open track to the elevator for cars that have been unloaded.

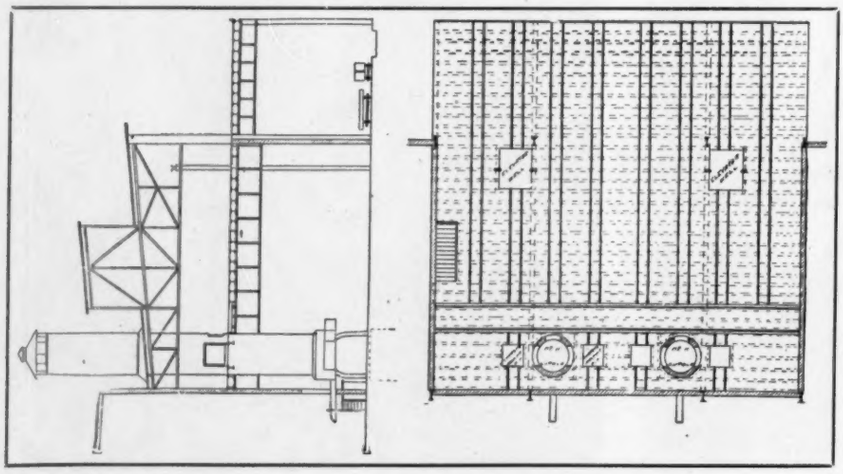


FIG. 4—END ELEVATION AND PLAN VIEW OF CHARGING FLOOR OF THE PENNSYLVANIA GENERAL ELECTRIC CO.'S FOUNDRY

If desired, cars may be provided with flat tread wheels, suitable for a plate floor, or with combination wheels, which may be used both on the track and the plate floor. A special design, made by the Whiting Foundry Equipment Co., Harvey, Ill., has a platform overhanging at one end so that when the load is properly adjusted, it will almost balance on one axle. By means of a handle at the other end of the car, it may be readily turned and pushed in any direction. When proper arrangements are made, charges may be dumped into the cupola from this car. It is backed up to the charging door, the wheels are blocked and the forward end is lifted by a suitable hoist. The skip car operating on an incline with automatic dumping device, is also used for charging cupolas.

Another device for charging cupolas mechanically, consists of a trolley operating on the jib of a crane or on a track, which extends into the cupola. Charges are made up as desired in a cylindrical bucket, with drop bottom doors, which is carried on this trolley. Hoisting and trolley travel movements are operated by power and the drop doors are opened by releasing a latch.

The Whiting charging machine is used in connection with a simple design of car having steel plate ends, about 12 inches high, for iron charges and is provided with a plate body with a swinging side door, hinged at the top, for coke. On the side dump machines, cars are pushed onto a hinged platform, locked with a simple hook which engages a loop on the car frame, the platform and car are raised together by power, and the charge dumped. The distribution is under the perfect control of the operator, the charges being delivered to the opposite side of the cupola by a sudden, and to the near side by a slow, hoisting movement. End dump machines are supplied when conditions require it, but side dump cars are preferred, as the cars do not have to be turned to place them on the machine. Fig. 6 illustrates an end dump machine.

Large Charging Machines.

Fig. 3 shows a compound charging machine in normal and dumping positions. A pneumatic cylinder hoist furnishes the power for this machine. An electric geared hoist may be substituted for the pneumatic hoist. On the electric compound machine, only one hoisting mechanism is required as the design provides for the inclination of the platform without independent hoist. A crane type of controller is used, which permits wide ranges of speeds and insures a

uniform distribution of the charges. Fig. 5 shows a side and end elevation of an electric, compound charging machine, and Figs. 1 and 2 show one of these machines installed in the foundry of the Delaware, Lackawanna & Western railroad, at Scranton, Pa. The charging door in the cupola, used in connection with the charging machine is larger than the ordinary door for hand charging and is set lower. An inclined chute is arranged to receive the stock as it is dumped from the car. The charging machine is provided with an apron plate, which overlaps the chute and prevents the iron from dropping from the car to the floor. A vertical distance of four or five feet between the top of the stock in the cupola and the sill of the charging doors is necessary to provide space for the distribution of the charges. Therefore, the charging floors should be higher than when charging is done by hand.

These machines have an hourly capacity of 10 to 15 tons or more, the economy of operation increasing as the output per hour increases. For a cupola melting 20 tons per hour, two men with a charging machine attend to all the charging operations, where otherwise five or six men would be required. Another advantage of this machine is that its location is fixed in relation to the charging door and conditions of operation are always uniform. The cost of installation is small, much less in fact than the extra cost of cars with hinged bodies would be for any moderate size plant. Charging cars, only, are required and they are of design that can be used for ordinary hand charging.

The layout of the charging floor, to be installed by the Pennsylvania General Electric Co., Erie, Pa., is shown in Fig. 4. This floor is served both by traveling yard crane and elevators. A transfer car makes connection with all storage tracks and with tracks to the charging machine. Two No. 11 Whiting cupolas, having a capacity of 24 to 27 tons each, will be used, and each cupola will be served by two charging machines.

Boston Branch

Edgar Allen & Co., Ltd., Sheffield (Eng.), manufacturers of high-speed air-hardening steel, special high-speed steel and high grade tool steels, have established a New England branch at 71 Kilby street, Boston. This concern has offices and warehouses where steel stocks are carried, in Chicago, New York, Pittsburg and Buffalo, and it is the intention to establish branches in other cities. The Boston branch will be under the management of Harry B. Eaton, who, during the past 10 years, was manager for Hermann Boker & Co.

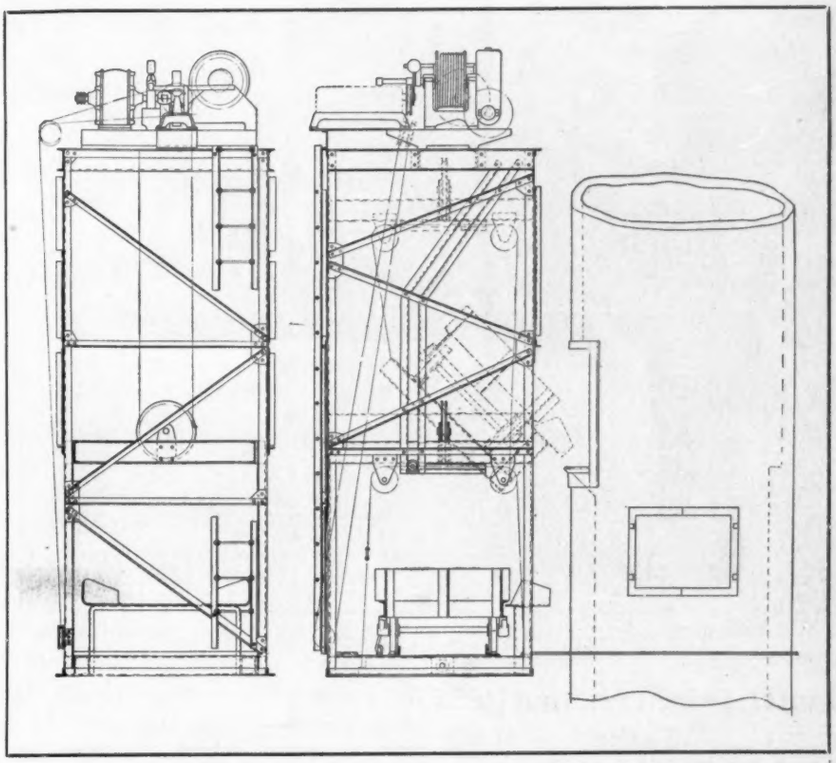


FIG. 5—ELECTRICALLY-DRIVEN, COMPOUND CUPOLA CHARGING MACHINE

Briquetting Iron Ores

The briquetting of fine iron ores is a subject that has received much attention of late and a recently issued patent proposes to accomplish this by the use of binders. In this method, 3 gallons of water, 15 pounds of dry pulverized clay, 2 pounds of sal soda and 1 pound of alum are added to 3½ gallons of molasses previously acidulated with 2 ounces of hydrochloric acid, and the whole is used to wet down one ton of fine ore. After being thoroughly mixed, the mass is heated to a temperature of about 350 degrees Fahr., and when the material feels dry to the touch, it is passed through a briquetting machine. It is claimed that this process produces a hard, practically unbreakable briquette, due to carbonization of the molasses and the bond formed by the salts and clay.

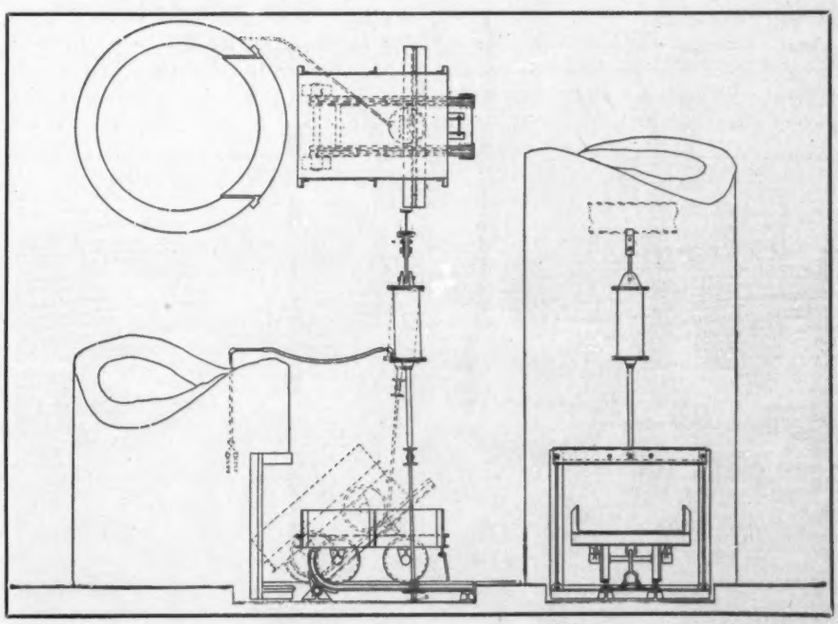
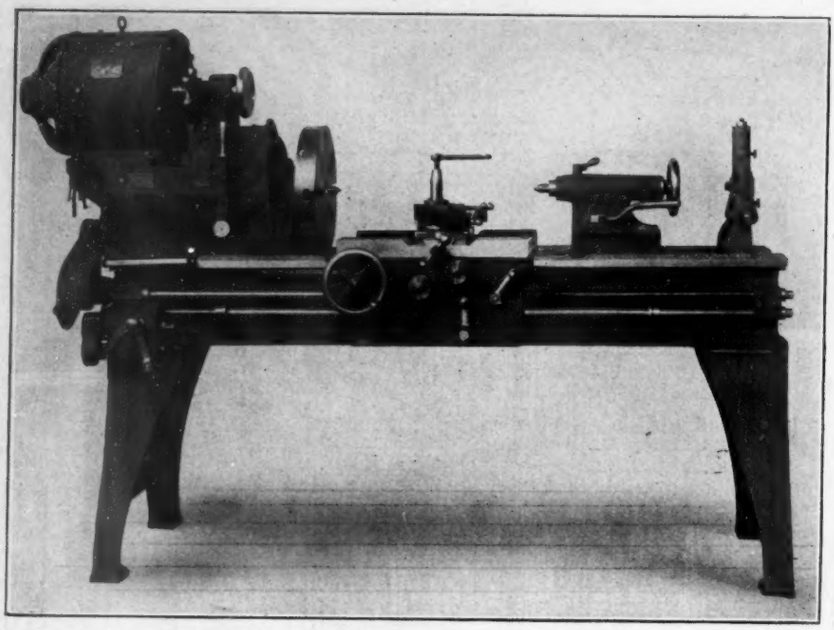


FIG. 6—END DUMP CUPOLA CHARGING MACHINE

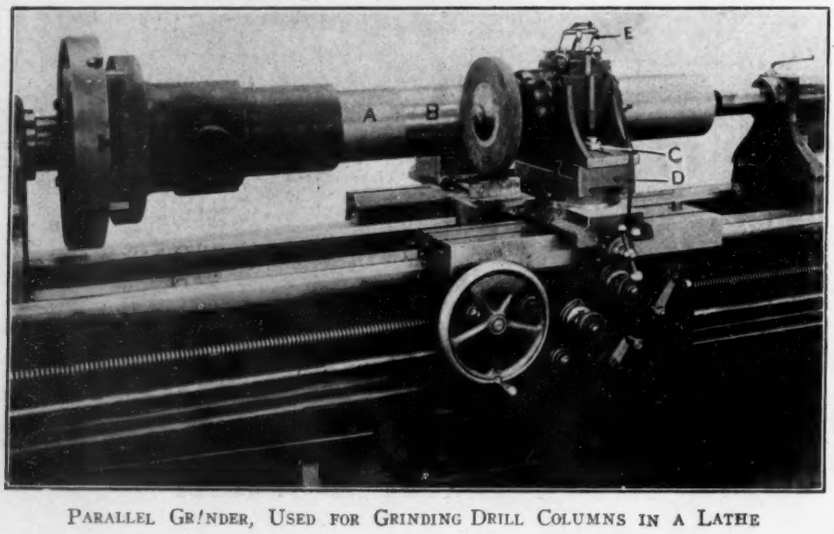


A 14-INCH, MOTOR-DRIVEN FRICTION HEAD LATHE

Motor-Driven Friction Head Lathe

A 14-inch, motor-driven friction head lathe built by the Hamilton Machine Tool Co., Hamilton, O., is shown herewith. A variable speed motor directly controlled and operated by a line and starting switch is mounted over the headstock and is direct-connected to the spindle by gearing. The motor can be operated at any speed from 400 to 1,200 revolutions per minute by shifting the armature with the regulating screw. With the motor speed variation of three to one, the mechanical changes in the head and the back gears provide an infinite number of speeds within the limits of the motor. A friction head operated by a vertical upright lever is located between the spindle and transmission gears. The friction is powerfully built to transmit the full power of the lathe and has an adjustment for taking up wear without reversing the parts. The gearing in the headstock is entirely enclosed, direct-connected and is of the quick change gear type. A quick-acting locking device is fitted to the cone spur gear by which the cone pulley is locked and unlocked.

The spindle is made of crucible steel and operates in self-oiling phosphor bronze boxes fitted with wick oilers. The longitudinal and cross speeds are both friction driven and are reversible from the apron with the friction acting as a safety device. A positive gear feed is used and the turning feed is driven from a separate rod, the lead screw being used only for screw cutting. The automatic stop operates in both directions which permits work to be chased to the shoulder and it can be used for internal chasing and boring. For duplicate work the collars can be set at any desired point, stopping the carriage from either direction. The bed is unusually heavy and is provided with three large V-ways, and one flat way in front which permits the use of a strong cross bridge. The feeds vary from 0.002 to 0.125 inch per revolution of spindle, while the threads per inch that can be cut range from 2 to 112.



PARALLEL GRINDER, USED FOR GRINDING DRILL COLUMNS IN A LATHE

A Parallel Grinder

A parallel grinder built by the Hisey-Wolff Machine Tool Co, Cincinnati, and used for finishing large radial drill columns by the Mueller Machine Tool Co., Cincinnati, is shown in the accompanying illustration. The column is ground after it has been rough turned in the lathe and the section at *A* shows the column after being rough turned and before being ground, while *B* illustrates the surface of the column after grinding. The base of the grinder frame is bolted to the lathe slots with a T-bolt, shown at *C*. The grinder is electrically-driven and the electric cable is sufficiently long to permit of the free movement of the grinder back and fourth. An operating switch for controlling the grinder motor is located on top of the grinder at *E* and within easy reach of the operator. This grinder is built in four sizes, one-half, one, two and three-horsepower capacity, respectively. An 8 x ¾-inch wheel is used on the smallest size, a 10 x 1-inch wheel on the one horsepower grinder, an 11 x 1¼-inch wheel on the two-horsepower grinder and a 14 x 2-inch wheel on the three-horsepower grinder. The operating speed varies from 2,600 revolutions per minute for the smallest size to 1,400 revolutions for the three-horsepower grinder. Alternating or direct current can be used for operating the grinder, as desired, on any voltage up to 220. The use of this portable grinder for finishing work in the lathe obviates the necessity of removing it and setting it up in a universal grinder or other machine. The time required for finishing is about equal to that required by universal grinders. This parallel grinder is particularly adapted for finishing rolls, bushings and crank shafts, connecting rods, wrist pins, piston rings, etc. The motor is entirely enclosed and is dustproof.

The city of Sacramento, Cal., has voted a bond issue of $800,000 for the erection of reinforced concrete and steel schoolhouses.

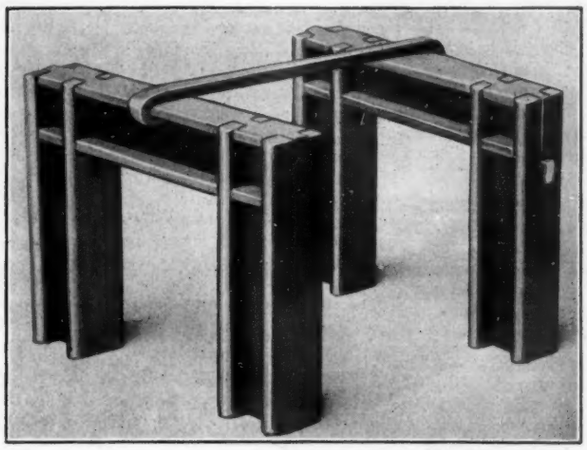


FIG. 1 — INTERLOCKING STEEL SECTIONS WITH SUPPORTS PLACED AT RIGHT ANGLES TO THE GIRDERS

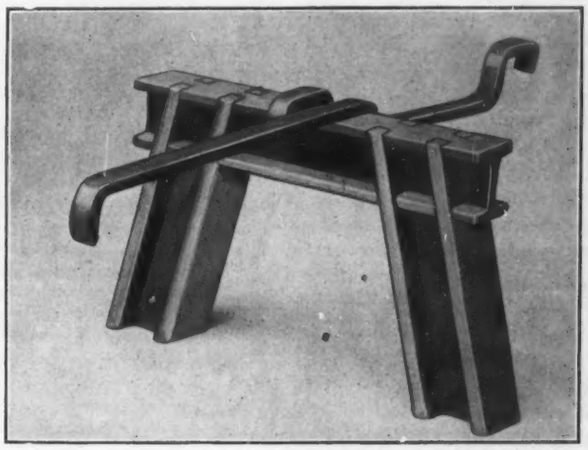


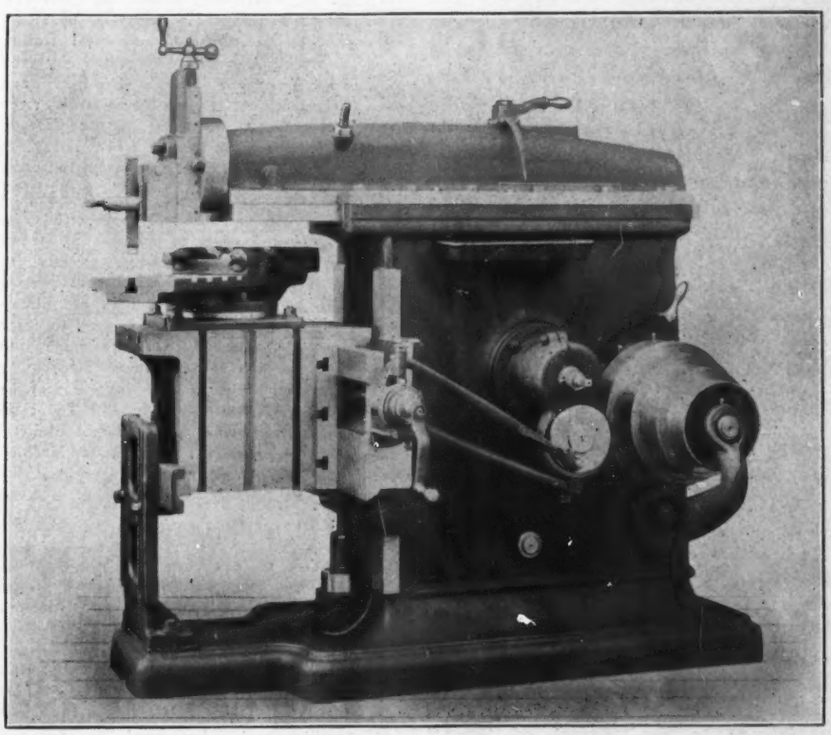
FIG. 2 — INTERLOCKING STEEL SECTION WITH SUPPORTS INCLINED TOWARD EACH OTHER

Interlocking Steel Sections

A system of interlocking structural steel sections which eliminates the use of rivets in binding this material together, has been developed by Wesley Wait, 58 Second street, Newburgh, N. Y. This system of interlocking these sections can be used in subways and culverts, in the erection of viaducts and sub-cellars, as mine supports and in reinforced concrete construction. The steel used is of H-section and is utilized for the supports or columns and for the transverse beams or girders. The flanges of the section serving as the column are slotted in the line of the web to a depth to permit of the insertion of the web of the girder. The flanges of the girder section are slotted on either side almost to the line of the web. The girder is set onto the column so that the four posts of the latter made by cutting away part of the web, engage the slots in the flange of the girder. The web of the girder is seated in the slots of the column. Reinforcement is provided by a key placed in the slot of the column and extending a short distance beyond the inner slot of the girder. In this way the posts of the column and the surface of the upper flange of the girder, interlock and the sections are held together. Cross hangers may be employed when necessary. When the sections are interlocked they practically form a single steel section and the possibility of shearing is practically eliminated. The advantages claimed for this system of interlocking as compared with riveted sections, is that the danger of shearing off rivet heads is entirely removed and each unit of construction is so adjusted that the weight is equally distributed over the entire section. In Fig. 1 these steel sections are shown assembled with the supports at right angles to the girders and in Fig. 2 the supports are inclined toward each other as adapted for use for mine timdering.

A New Shaper

A back geared crank shaper fitted throughout with heat-treated radial bearings and built in 16, 20, 24 and 28-inch sizes by the Queen City Machine Tool Co., Cincinnati, is shown in the accompanying illustration. Frequently, much trouble is experienced in the operation of shapers owing to insufficient lubrication and inadequate bearings and this type has been designed to eliminate these points of weakness. The body of the crank pin is a crucible steel casting with a heat-treated sleeve pressed over it and is ground to a running fit in a cast iron crank block. This block has channels cut in its face to insure a thorough distribution of the oil, which is lifted from the oil reservoir onto the crank pin by the chain ring oiler and flows back by gravity. Taps are supplied for drawing off the oil and for replacing it with a fresh supply, thereby insuring a continuous flow over the bearing shafts. A hardened sleeve, ground to size, is pressed over the bull wheel hub. An oiling device similar to that provided for the crank pin is used.



SHAPER OF NEW DESIGN, BUILT BY THE QUEEN CITY MACHINE TOOL CO.

On the cone pulley shaft a three-point bearing has been provided to counteract the overhang. The driving and driven shaft journals are heat-treated and ground and operate in removable cast iron bushings and are flooded with oil by ring oilers. On the rocker arm and link shafts a gravity mechanical lubricator is used in place of the ring or chain, as the movement is not rotary, only about one-fourth of a circle being described. To obtain the highest efficiency at the cutting tool, the countershaft should operate at a speed of 270 revolutions per minute. For a two-inch belt, four cone steps, 6, 7-9/16, 9⅛ and 10-11/16-inch face, respectively, are provided, with a single back geared ratio of four to one. Twelve changes of speed and eight cutting speeds for every change in stroke are instantly available in any combination. The feed screws are fitted with micrometer adjustment and graduated swivels. The arch ram has an exceptionally large bearing surface in the column and the rail is heavy and has a large bearing surface in the column and on the saddle, thereby preventing springing due to the overhang. Work can be machined on the shaper that is accurate to 0.0005 inch for the full 16-inch stroke. The shaper is built low for the convenience of the operator and permits the use of a very long ram. The elevating table is on the reverse side and cannot be confused with the cross traverse screw. The table support moves automatically up and down with the rail and its slide is in line with the top surface of the rail so that it does not depend upon the base of the shaper for its alignment. This support is gibbed closely to the table, thereby preventing springing due to both the thrust and the lift of the tool when taking heavy cuts. This table support can be adjusted vertically and is provided with ample bearings on the widest cross traverse and the support on the end of the table is most effective when the stroke approaches this point. Special power feed to the head, revolving and tilting top table, concaving-convexing attachment, and special keyseating devices are built on the standard machine when specified. Motor drive with constant or variable speed motors can be used with the gear box on the shaper if desired.

Toms & Blair, sheet metal workers of San Diego, Cal., have let the contract for a new two-story factory building, to be 50 x 100 feet in area. Machinery to the amount of $25,000 will be installed.

New Catalogs

TRANSFORMERS. — The Crocker-Wheeler Co., Ampere, N. J., has issued a booklet containing transformer data, in which is included a table showing the comparative efficiencies of the leading transformers made. The process of manufacturing the Remek transformer is described at length.

ELECTRICALLY-DRIVEN PUMPS.—The General Electric Co., Schenectady, N. Y., in a recent bulletin, describes its line of electrically-operated pumps. These pumps are built for various purposes, including mine service, operation in sewage disposal plants and dry docks, for irrigating purposes, etc.

AUTOMOBILE INSTRUMENTS. — The General Electric Co., Schenectady, N. Y., in a recently issued booklet, describes its new combination ammeter and voltmeter for use on electric vehicles. This instrument is enclosed in a dust proof and moisture proof aluminum case and is designed to withstand constant vibration and exposure.

ELECTRICAL TUNNEL EQUIPMENT.—The General Electric Co., Schenectady, N. Y., has issued a bulletin describing the electrical equipment installed in the Detroit river tunnel. A number of illustrations show the locomotives in use, the exteriors and interiors of converter and transformer sub-stations, the location of the apparatus, and explain the methods of wiring and insulating and the general construction of the tunnel.

BELT-DRIVEN ALTERNATORS.—A standard line of belt-driven alternating current generators is described in a bulletin issued by the General Electric Co., Schenectady, N. Y. These generators range in capacity from 50 to 200 kilowatts and are adapted for three-phase or two-phase winding without change except in the armature coils and winding blocks, the exciters and all accessories being the same for both. Designs have been made for 240, 480, 600, 1,150 and 2,300 volts.

ELECTRICITY FOR STEAM RAILROADS.—The General Electric Co., Schenectady, N. Y., has issued a bulletin containing data relative to the use of electricity by steam railways. It describes the electrical station and the road equipment operated by the New York Central & Hudson River railway; the Michigan Central, in the Detroit river tunnel; the Great Northern, in the Cascade tunnel; Baltimore & Ohio, West Jersey & Seashore, the West Shore, and other railroads.

FORGING AND BENDING PRESSES.—The Mesta Machine Co., Pittsburg, has issued a catalog devoted to its line of steam-hydraulic forging and bending presses of the Haniel & Lueg type. In these presses the steam and hydraulic cylinders are direct-connected, thus making it unnecessary to force the water in the press cylinder through pipes while the machine is in motion. Owing to this self-contained feature the presses may be economically installed and operated. The catalog contains a number of handsome illustrations of these presses. The Mesta Machine Co. has obtained the exclusive manufacturing rights in this country for the Haniel & Lueg presses.

ELEVATING AND CONVEYING MACHINERY.—The extensive line of elevating, conveying and concrete machinery, built by the Chain Belt Co., Milwaukee, is listed in a comprehensive 278-page catalog, recently issued. The varied applications of this equipment are exceedingly numerous, and the photographs of the actual installations are interesting, in that they include systems for not only handling coal, ashes, sand, etc., but can be adapted for conveying almost any material, such as pulp wood, flooring in saw mills, and in fact in every plant where material is to be conveyed from one department to another. The various sizes of detachable chain belts are illustrated, as well as interlocking bolted chain belts, interlocking bolted roller chain belts, interlocking riveted chain belts, etc. Sprocket wheels and all of the necessary accessories for this equipment are shown and price lists are included. The work concludes with tables and data on the horsepower of gears, rules for determining the size and speeds of sprocket gears and pulleys, speeds recommended for operating centrifugal discharge elevators, conveying capacities of standard scraper conveyors, weights of materials, steel angles, etc.

THE BEAVER BRIDGE.—In a handsomely illustrated, 40-page brochure, the construction of the Beaver cantilever bridge over the Ohio river, at Beaver, Pa., built by the McClintic-Marshall Construction Co., Pittsburg, is illustrated and described. This bridge is a notable engineering work and was built for the Pittsburg & Lake Erie railroad, to take care of the increased traffic and loadings of the road, and replaces the old single-track structure, which was built about 20 years ago. The length of the bridge between parapet walls is 1,800 feet; approach span, 320 feet; channel span, 769 feet; cantilever arms, 242 feet, and the suspended span is 285 feet. The width of the bridge is 34 feet 6 inches, the clearance above low water, 90 feet, and the maximum height of truss, 145 feet 2¼ inches. The bridge in general is of the pin-connected type, but all joints where reversal of stress occurs are riveted. The structure was tested with two trains, each consisting of four 168-ton engines with five 75-ton ore cars on each side, the total test load amounting to 5,684,000 pounds and covered the length of the suspended span and one cantilever. The test was entirely successful. The total weight of the structure is 16,000 tons.

HIGH SPEED FORGING PRESSES.—In a handsomely illustrated, 48-page catalog, the United Engineering & Foundry Co., Pittsburg, illustrates its line of high speed forging presses of the steam-hydraulic intensifier type, which are built for all classes of forging, shearing or pressing in capacities from 100 to 12,000 tons. This type of forging press is built by the United Engineering & Foundry Co. under the Davy Bros., Ltd., patents. It is stated that throughout Europe, steam hammers for forging armor plate, gun parts, marine and general heavy forging, have been largely replaced by the high speed hydraulic forging press. The single lever controlling gear permits the hydraulic forging press to be operated at as high a rate of speed as a steam hammer and by this control the movement of the presshead exactly follows the operator's hand, both as to speed and in length of stroke, so that while the high speed can be obtained for certain classes of work, a slow speed may also be used when forging to exact size or for such operations as punching and shearing. In addition to being adapted for all kinds of forging work, this press can be used for cogging hard steels, slabbing and punching tire or wheel blanks and also for forging railway axles and various classes of drop-hammer work. The catalog contains illustrations of a large number of installations of forging presses in various plants throughout the United States. Interesting views of the works of the United Engineering & Fdy. Co. are also included, which show the tremendous facilities of this concern for producing powerful machinery, including not only these presses, but all kinds of rolling mill equipment as well.

IRON AND STEEL SECURITIES

Last week's operations on the New York stock exchange were moderately active, but prices continued to move within a narrow range.

On Monday, railroad stocks advanced to the high average of the year; grain markets were higher; industrial stocks were irregular, closing lower. Heavy pressure in smelters on Tuesday forced prices downward; steel shares were active. Wednesday, rumors of government interference and heavy selling brought about a bearish sentiment toward steel shares. Pressure continued on Steel common on Thursday, with seemingly little effect, and but little trading was done. On Friday, dullness continued, and attention was devoted mainly to railroad issues. On Saturday trading was light, and Steel common recovered slightly from the week's depression.

Money on call ranged from 2½ to 2 per cent. Time money was quiet, with an increase in offerings during the closing days. The statement of the actual condition of clearing house banks showed loans increased $47,190,000; total reserve, $530,154,000; excess of reserve, $59,763,000, a decrease of $24,799,000; and the percentage of reserve was 28.17, compared with 29.53 the week previous. Non-member banks and trust companies showed loans decreased $1,193,900; net deposits increased $1,818,500; reserve on deposits increased $1,214,200, and the percentage of reserve 19.2 against 19 the week previous. Commercial failures for the week were 254, as against 215 the preceding week, and 222 the corresponding week last year. Bank clearings for the week were about 10 per cent above the preceding week, and 10.5 per cent below last year. The fortnightly railroad statistics showed a decrease in the number of idle cars of 2,800, compared with 596 the preceding fortnight. Shares were sold to the number of 1,987,400, compared with 1,767,645 the preceding week, and 4,930,900 the corresponding week last year. Bonds, exclusive of government bonds, were sold to the amount of $15,791,000, compared with $13,369,000 the preceding week, and $9,150,000 the corresponding week last year.

	Closing Quo. July 1	Changes in week	Annual Meeting date 1911.	Stock Outstanding	Basis	Dividend Last Dividend	Dividend Date Last Div. Pay.
Allis-Chalmers	9	.....		$19,820,000		.....	.....
Allis-Chalmers, pr	29½	.....	Nov. 2	16,150,000	7 cum.	1¾ Q.	Feb., 1904
American Can	10⅜	— ½	Feb. 1	41,233,300		1¾ Q.	.....
American Can, pr	84¾	— ⅜		41,233,300	7 cum.	1¼ Q.	July, 1911
Am. Car & Fdy	56½	— ¼	June 29	30,000,000		½ Q.	July, 1911
Am. Car & Fdy., pr	117	+ ½		30,000,000	n. c.	1¾ Q.	July, 1911
American Loc	40¾	— ½	Oct. 17	25,000,000	5	1¼ Q.	Aug., 1908
American Loc., pr	110	.....		25,000,000	7 cum.	1¾ Q.	July, 1911
American Ship	64¾	—5¾	Oct. 11	7,600,000	4	2 Q. **	June, 1911
American Ship, pr	111	.....		7,900,000	7 cum.	1¾ Q.	July, 1911
Am. Steel Foundries	41½	+ ¼	Dec. 7	17,184,000		1 Q.	May, 1911
Barney & Smith	20	.....	June 6	2,000,000	4	1 Q.	Dec., 1907
Barney & Smith, pr	87	.....		2,500,000	8 cum.	2 Q.	Mar., 1911
Bethlehem Steel	33	— ⅝	April 4	14,862,000		.....	.....
Bethlehem Steel, pr	63	— ½		14,908,000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	44⅞	— ⅛	Mar. 21	45,000,000	5	1¼ Q.	May, 1911
Cambria Iron	44	.....		8,468,000*	4	2 S. A.	Apr., 1911
Chicago Pneumatic Tool	50½	—1	Feb. 20	6,485,800	4	1 Q.	July, 1911
Colorado Fuel	34½	— ½	Oct. 16	34,235,500		1¾ Q.	Apr., 1902
Crucible Steel	13	— ½	Oct. 18	24,578,400		3½.	.....
Crucible Steel, pr	81½	— ¾		24,463,500	7 cum.	1¾ Q.	June, 1911
Empire Steel	5	.....	Feb. 22	1,254,770		.....	.....
Empire Steel, pr	50	.....		2,500,000	6 cum.	1 S. A.	July, 1911
Fay & Egan	70	.....	Feb. 21	1,000,000	6 cum.	3 S. A.	Feb., 1911
Fay & Egan, pr	110	.....		1,000,000	7 cum.	1¾ Q.	Feb., 1911
General Electric	161¼	—3¼	May 9	65,179,600	8	2 Q.	July, 1911
Harbison-Walker	45	.....	Jan. 16	18,000,000		½ Q.	June, 1911
Harbison-Walker, pr	98	.....		9,600,000	6 cum.	1½ Q.	July, 1911
International Pump	41¾	.....	Dec. 12	17,762,500		1 Q.	Nov., 1910
International Pump, pr	89⅞	.....		11,350,000	6 cum.	1½ Q.	May, 1911
Lackawanna Steel	42	.....	Mar. 8	34,978,000		.....	.....
Lake Sup. Corp	25½	—1½	Oct. 4	40,000,000		.....	.....
New York Air Brake	74⅞	— ⅝	Mar. 8	10,000,000	6	1½ Q.	July, 1911
Niles-Bement-Pond	94	.....	Feb. 8	8,500,000	6	1½ Q.	June, 1911
Niles-Bement-Pond, pr	104	.....		2,000,000	6 cum.	1½ Q.	May, 1911
Otis Elevator Co	72	— ½	Mar. 20	6,375,000	1	1 Q.	July, 1911
Otis Elevator Co., pr	101	—1		6,310,000	6 n. c.	1½ Q.	July, 1911
Pa. Steel	60	.....	May 8	10,750,000		.....	.....
Pa. Steel, pr	106½	.....		16,500,000	7 n. c.	3½ S. A.	May, 1911
Pittsburg Coal Co	19¾	—1¼	Feb. 10	28,104,600		.....	.....
Pittsburg Coal Co., pr	84⅝	—1⅞		27,071,800	7 cum.	1¼ Q.	July, 1911
Pressed Steel Car	37	.....	Feb. 15	12,500,000		1 Q.	Aug., 1904
Pressed Steel Car, pr	102	+ ¼		12,500,000	7 n. c.	1¾ Q.	May, 1911
Pullman	162	.....	Nov. 8	120,000,000	8	2 Q.	May, 1911
Railway Stl. Spring	36	—2¼	Mar. 2	13,500,000	2	1 S. A.	Oct., 1908
Railway Stl. Spring, pr	102	.....		13,500,000	7 cum.	1¾ Q.	June, 1911
Rep. Iron & Steel	30½	+ ¼	Oct. 18	27,191,000		.....	.....
Rep. Iron & Steel, pr	93¾	+ ⅜		25,000,000	7 cum.	1¾ Q.	July, 1911
Sloss-Sheffield	50⅜	+ ⅜	Mar. 15	10,000,000	5	1¼ Q.	Sept., 1910
Sloss-Sheffield, pr	112	.....		6,700,000	7 n. c.	1¾ Q.	July, 1911
U. S. Pipe & Fdy. Co	16½	—1½	June 28	12,106,300	7 n. c.	1 Q.	Dec., 1910
U. S. Pipe & Fdy. Co., pr	57½	—1⅞		12,106,300	2	1¼ Q.	June, 1911
U. S. Steel	78⅝	— ⅞	April 17	508,302,500	5	1¼ Q.	June, 1911
U. S. Steel, pr	118¼	— ⅛		360,281,100	7 cum.	1¾ Q.	May, 1911
U. S. Steel, 5s	105⅝	— ⅛		463,798,000	5	.....	.....
Va. Iron, Coal & Coke	72	+ ½	Sept. 19	9,073,680		5. †	Oct., 1907
Westinghouse Electric	75¼	—1⅝	July 26	3,998,700*		1¾ Q.	July, 1911
Westinghouse Air Brake	148½	—1½	Oct. 3	13,750,000*		5 Q. ‡	July, 1911

Par value of shares, $100, except those starred (*), $50.
**Includes last 1 per cent payment of 4 per cent extra.
†Stock.
‡Includes 2½ regular, 1½ extra and 1 special.

Copper Stocks.

New York.—Amalgamated Copper closed 69⅝, a net loss of 1⅝.

Boston. — Butte Coalition closed 19⅛, a net gain of ⅛; Calumet & Arizona closed 58¾, a net loss of 2¼; Calumet & Hecla closed 475, no change; North Butte Mining closed 33⅛, a net loss of 1¼; Quincy Mining closed 74, a net loss of 1.

Financial Notes.

The Harbison-Walker Refractories Co. has declared a regular quarterly dividend of 1½ per cent on preferred stock, payable July 20.

The Vulcan Detinning Co. has declared a regular quarterly dividend of 1¼ per cent on preferred stock, payable July 20.

The Pittsburg Coal Co. has declared the regular quarterly dividend of 1¼ per cent on preferred stock, payable July 25.

The Standard Steel Co., Bedford, O., has increased its capital stock from $40,000 to $100,000.

The Cleveland-Cliffs Iron Co. has declared a regular quarterly dividend of 5 per cent, payable July 25.

THE IRON TRADE REVIEW

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THE AVERAGE PAID CIRCULATION OF THE IRON TRADE REVIEW FOR THE ISSUES OF THE FOLLOWING MONTHS WAS:

April, 1910	5,793
May	5,827
June	5,842
July	5,864
August	5,875
September	5,895
October	5,955
November	5,993
December	6,026
January, 1911	6,058
February	6,072
March	6,091
April	6,108
May	6,112

July 6, 1911

Record Fiscal Year Exports

May exports of the tonnage lines in iron and steel amounted to 173,690 gross tons, falling 20 to 25 per cent below the record high exports of March and April, but exceeding those of January and February by between 10 and 15 per cent. If June shows exports only at the May rate the fiscal year's total will amount to 1,900,000 tons, or far in excess of the total in any previous fiscal or calendar year. Exports by fiscal years of the tonnage lines have been as follows:

1902	495,661
1903	302,492
1904	676,590
1905	1,123,580
1906	1,331,323
1907	1,229,245
1908	1,161,270
1909	1,059,239
1910	1,396,395
1911	1,900,000*

*Estimated.

The tonnage lines run from scrap and pig iron to pipes and tubes, cut and wire nails, etc. While the value of these tonnage lines is large, the value of machinery, hardware and cutlery, castings, etc., is still larger. The total value of all these lines of iron and steel is making a new record for the fiscal year. The value in May was $17,658,042, and a duplication of this value in June will make a total for the fiscal year of $228,000,000, whereas until very lately these exports have never closely approached $200,000,000 in either a calendar or fiscal year. For the past four fiscal years the exports have run as follows:

1908	$183,982,182
1909	144,951,357
1910	179,133,186
1911	228,000,000*

*Estimated.

The gain in exports of tonnage lines is due almost wholly to the aggressive policy of the United States Steel Corporation, as it conducts the great bulk of the business. Aside from its exports there are small exports of scrap and pig iron, rails exported by the Maryland Steel Co., and occasional exports of steel products by outside interests, as well as small exports of bar iron and cut nails, which the Steel Corporation does not make. The great bulk of the exports, however, is by the Steel Corporation. It has established various connections, banking and otherwise, put tramp steamers in service, and used other means to facilitate its business.

As statements are frequently made as to the percentage of capacity at which the Steel Corporation is operating, it may be of interest to observe that while no official statement has lately been made, the capacity upon which these percentages are based is about 14,000,000 tons a year. Accordingly, if the Corporation were exporting 1,400,000 tons a year and operating at 70 per cent capacity, this 70 per cent would be made up of 60 per cent on domestic business and 10 per cent on foreign business. As a matter of fact its exports lately have been averaging about 2,000,000 tons a year, or between 14 and 15 per cent of its total capacity.

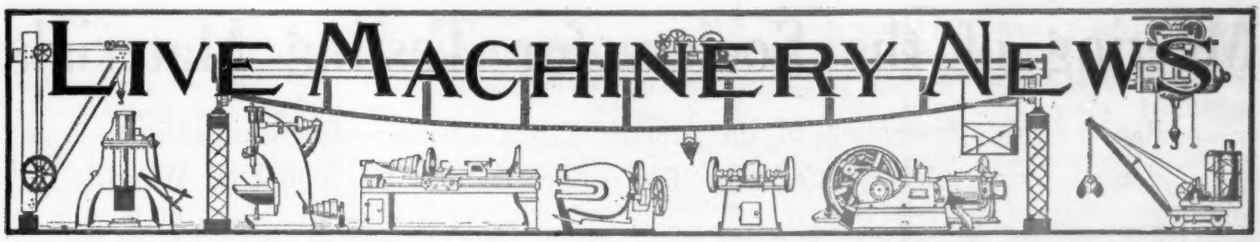
MARKET IMPROVEMENT

Is Helping in the Settlement of Wage Questions.

The Amalgamated Association of Iron, Steel and Tin Workers has renewed its 1910-11 wage scale with practically all companies dealing with this association, with the exception of the members of the Western Bar Iron Association. On June 5, the latter demanded a reduction of 10 per cent in wages, but the Republic Iron & Steel Co. has re-affirmed the 1910-11 wage scale, and it is likely that the Western Bar Iron Association will take similar action at the next joint conference to be held at Cambridge Springs, Pa., July 5. The wage scales signed by the independent sheet and tin plate manufacturers and the Republic Iron & Steel Co. during the past week have become effective July 1. The Western Bar Iron Association has a continuous working agreement with the Amalgamated Association, and pending a settlement, the men will continue working under the present scale, which expired Friday midnight of last week.

President Moreland of the United Sons of Vulcan, states that no trouble is expected over the wage scale with the companies employing members of this organization. The United Sons of Vulcan at present has a wage agreement with 14 companies, chiefly in western Pennsylvania and eastern Ohio, employing upward of 2,000 puddlers when running full. The association has asked for a renewal of the present scale. No joint meetings will be held this year, as President Moreland does not expect any trouble, and committees in the different mills will take the wage scale up separately with the companies by which they are employed. No signed scales have been received at headquarters so far, as most of the mills employing members of this organization closed Friday of last week for a period of one week or 10 days. The association has no continuous working agreement with the employers.

Belgium Pig Iron.—The aggregate pig iron output in Belgium for the first five months of 1911 was 853,600 tons, as compared with 753,220 tons for the corresponding period in 1910. Belgium stacks in blast on June 1, 1911, numbered 41, as against 40 on June 1, 1910.



Foundries

The Hart-Parr Co., Charles City, Ia., advises that it is making additions to its gray iron foundry.

Ohio interests are reported to be considering the establishment of a malleable iron plant at McMinnville, Tenn. Address the secretary of the Commercial Club.

The city of Belleville, Ont., on June 26 adopted a by-law to provide a $1,500 site, guarantee bonds for $25,000 for 20 years and make a fixed assessment of $6,000 for 10 years, to the Marsh & Henthorn Co., Ltd., foundryman and machinery manufacturer.

The Model Machine Tool Co., Cincinnati, O., is considering the establishment of a plant at Maysville, Ky., and is negotiating with the Maysville Foundry Co., which has not been operating for the past few months, for the use of its buildings. G. C. Atkinson, of Cincinnati, is one of those interested, and has been in communication with Maysville people.

The Fulton Iron Works, St. Louis, will build a complete new modern plant consisting of a machine shop, foundry, blacksmith shop, pattern shop, pattern storage and office building. The contract for the steel work has already been let. The company will be in the market for considerable machinery but the details have not yet been definitely settled.

Machine Tools

Some of the equipment of the J. Lott Machine Co., millwright, Louisville, Ky., whose shop was recently damaged by fire, is to be replaced at once.

Lathes, shapers and other machine tools will be purchased by Hite D. Bowman, Louisville, Ky., who is erecting a two-story addition to his automobile garage and repair shop.

The Multiple Sign Co., Louisville, Ky., is equipping a shop at 430 West Main street, that city, for the manufacture of signs. Machine tools, milling machines, die machinery and other equipment will be required.

Extensive improvements will be made at the plant of the Co-operative Flint Glass Co., Beaver Falls, Pa., including repairs to the furnaces and the installation of drill presses, a band saw, a carbon and emery machine, two lathes and a shaper.

Charles F. Perry, supervisor of industrial education, Milwaukee, announces that plans for the proposed new $210,000 Milwaukee school of trades for boys will be ready for bids in about six weeks' time. Work will probably begin about Aug. 15. Frank M. Harbach is secretary and business manager of the board of school directors.

The Cleveland Electric & Machine Mfg. Co., Cleveland, recently incorporated with $25,000 capital, will locate in the Guggenheim building, near East Ninth street and Bolivar road, that city, to manufacture meat chopping and grinding machinery. It is in need of a power plant, lathes, trip hammers, heating and tempering furnaces, pulleys, hangers, etc. The incorporators are: Ben. Fauld, August Bender, A. Mannhardt, J. S. Schwenger and Adolph S. Klein.

New Works

The Gulf City Boiler Works, Mobile, Ala., will require machinery for the equipment of a plant which it has recently purchased.

The American Creosoting Co., 95 Liberty street, New York city, will erect a steel factory building on Lister avenue, Newark, N. J.

The Massillon Bridge & Structural Co., Massillon, O., is reported to have taken an option on a 17-acre site upon which it proposes to construct large fabricating shops.

The Kissel Motor Car Co., Hartford, Wis., has acquired one acre adjoining its present holdings and will build several additions. The first unit will be an assembly and erecting shop, 100 x 200 feet, of solid brick construction, to be ready Nov. 1.

The contract for erecting the new wheel shop for the Brooks plant at Dunkirk, N. Y., has been awarded to B. F. Aldrich, that city. The building will be an extension to the present boiler shop, and will cover an area 260 x 80 feet.

The Cockshutt Plow Co., Brantford, Ont., announces that an extension embracing five new buildings will be commenced at once, to be ready for operation in the fall. The staff, now numbering 800, will then be increased by from 300 to 500 additional men.

The general contract for a two-story factory building, 287 x 470 feet, has been let to the Lackawanna Bridge Co., 2 Rector street, New York. The plant will be built at Bayonne, N. J., for the American Radiator Co., Chicago, and is estimated to cost $200,000.

The Cole Motor Car Co., Indianapolis, is working on plans for an increase in its factory facilities and it is expected that it will complete a new plant by Nov. 1, which will double its present capacity. This company reports that its present space is inadequate.

The Luther Grinder Mfg. Co., 247-253 Madison street, Milwaukee, has opened negotiations with the business men's association of Sheboygan, Wis., with a view to locating its plant at that point. It is stated in a communication to President Pfister, of the association, that the company has outgrown its present quarters, a three-story building devoted to the manufacture of tool grinders, and is obliged to seek larger quarters.

Power Plant Equipment

Orangeville, Ill., is contemplating the installation of an electric lighting plant.

Mansfield, Mass., has voted a bond issue of $22,500 for improving the municipal electric lighting plant.

Los Angeles, Cal., will advertise for new bids on an electric generating set to be installed in the new hall of records.

The Central Pennsylvania Traction Co., Harrisburg, Pa., contemplates the installation of additional generating capacity.

The city of Hamilton, Ont., on July 25 will vote on a by-law to raise $500,000 for the installation of an electric power and lighting plant.

Power generating apparatus will be needed by the Bluefield Gas & Power Co., Bluefield, W. Va. Plans are being prepared by T. George Carrol, Baltimore.

The Gadsden Concrete Co., Gadsden, Ala., is asking for prices on engines, boilers and other power machinery. Address E. C. Little, president.

Meeting of the Society for Testing Materials

Report of the Proceedings of the Atlantic City Gathering—Interesting Discussion of the Accelerated Corrosion Test—Specifications for Solid Steel Wheels

Widely divergent opinions as to the relative value of the accelerated acid test as a measure of the corrosion of iron and steel in service, were expressed by the supporters and opponents of this method of testing at the fourteenth annual meeting of the American Society for Testing Materials, held at Atlantic City, June 27 to July 1. The committee on the corrosion of iron and steel again directed attention to the tentative suggestions made by it in 1907 as to the conditions for carrying out the so-called acid corrosion test which were not to be considered a recommendation of that test, and that the results of such tests are unreliable as truly measuring the tendency to natural corrosion. The chairman of this committee, however, explained that while the report received his signature acting in his executive capacity, it does not represent his personal opinion as to the value of the accelerated acid test.

An unusually large number of specifications was presented for the consideration of the society and included the first standards prepared for solid steel wheels for passenger and freight car service. Considerable time was also devoted to the discussion of proper methods of annealing carbon and nickel steels and the practice recommended for annealing carbon steel objects represents years of investigation on the part of the members of the committee on the heat treatment of iron and steel. Progress was also reported by the committee on international specifications for steel, although a slight difference of opinion exists as to the best method of procedure to effect their early adoption by the countries concerned.

The growing shortage of natural gas in the Pittsburg district and the difficulties experienced in working to the exceedingly low sulphur limits contained in some specifications, with producer gas, was referred to by representatives of several of the large steel manufacturers of western Pennsylvania.

Alexander E. Outerbridge Jr., of Philadelphia, described and made a practical demonstration of a simple method of detecting mineral and resin oil in other oils. This test has already proved of great value in detecting adulterants in linseed oil used as a binder for cores, but to the paint trade this discovery is of the utmost importance.

During the year the American Society for Testing Materials has experienced a healthy growth in membership, the net gain totaling 102, and for the first time in the history of the organization a surplus was reported in the treasury. The attendance for the week aggregated nearly 400, and was considerably in excess of that at any previous meeting.

In the preparation of specifications, not only for iron and steel products, but also for non-ferrous metals, the various committees of the American Society for Testing Materials performed a tremendous amount of work during the year. New specifications on solid steel wheels and steel reinforcement bars were submitted by the steel committee and specifications were presented also on the magnetic testing of iron and steel, recommended annealing practice for rolled and forged carbon steel objects and standard specifications for spring steel.

The committee on standard specifications for steel reported that 11 subcommittees have been appointed for the better systematization of the work of the committee and the subjects have been assigned as follows: No. 1, Bessemer, open-hearth and steel girder rails and splice bars; No. 2, structural steel for bridges, buildings and ships; No. 3, steel axles and heat-treated steel axles; No. 4, rolled steel wheels and steel tires; No. 5, steel forgings; No. 6, steel castings; No. 7, steel reinforcement bars; No. 8, open-hearth boiler plate and rivet steel; No. 9, locomotive materials in general; No. 10, steel wire, and No. 11, automobile steel.

International Specifications for Steel.

The adoption of international steel specifications was discussed in the progress report submitted by the American members of the international sub-committee on the introduction of international specifications for steel. Special attention was directed to a resolution adopted in London in July, 1909, which recommended the specifications for the national testing societies of Germany, England and America for use on export orders. This was done in preference to recommending the specifications of any individual engineer or railway company, as these specifications were in more general use and had been prepared by committees on which both consumers and manufacturers were represented.

In further reference to these specifications, the report is briefly as follows:

It was not claimed that any one of these specifications was the equivalent of the others, but it was thought that if material was manufactured in any of the countries under its own specification it would probably be better than if it was manufactured under the specifications of the other countries, which would contain requirements with which the mills were not familiar. If this course is followed and the users of materials become familiar with the requirements and materials of each of the three countries, they will soon learn which is best suited to their needs, purchase in that country or ask for modifications from the other countries so as to get similar material. Moreover, it was suggested that trial orders be manufactured under the specifications of the other countries so as to familiarize the manufacturers with the requirements of all three countries.

The use of a national specification for each country for export orders has been criticized as tending to *fix* such specifications, and thus to prevent international specifications. The recommendation of the first London resolution covering this point has been criticized as being too strong, and a modification has been suggested by which these national specifications would be certified by the international association as standard specifications of the national societies for these countries. In other quarters objection has been made to any form of endorsement or certification whatever of these national specifications.

Until a national specification has been definitely fixed and has come into general use, it would have little or no weight in arriving at the ultimate requirements for an international specification, when compared with national specifications of other countries which are definitely fixed and in general use. It is, therefore, of the utmost importance that between now and the International Congress in 1912, everything possible should be done to harmonize our specifications with the leading American specifications, in order that they may carry the proper weight at the congress.

Standard Specifications for Steel.

The committee on standard specifications for steel submitted four specifications, as follows:

Proposed standard specifications for forged and rolled, forged, or rolled solid steel wheels for engine truck, tender and passenger subway and elevated railway service.

Proposed standard specifications for forged and rolled, forged, or rolled solid steel wheels for freight car service.

Proposed standard specifications for

heat-treated carbon steel axles, shafts, and similar parts.

Proposed standard specifications for steel reinforcement bars.

The reference of the two specifications for forged and rolled solid steel wheels for letter ballot was objected to as it was contended that the carbon range of 0.60 to 0.85 per cent allowed the manufacturer too much latitude. It was furthermore contended that service conditions should be thoroughly investigated before the final adoption of the specifications. One of the members who had occasion to study the service tests of a large number of steel wheels said that narrow carbon limits are desirable and as the wheels must be judged in pairs, they must be carefully mated in service according to their carbon content. Two wheels on the same axle of varying carbon content will give widely different service results. The hard wheel will crowd over the soft wheel, causing rapid wear in the throat of the flange and the pair of wheels will have to be renewed on account of the rapid wear of the soft wheel.

Solid Steel Wheels.

James H. Gibboney, of the Norfolk & Western railroad, said that from 60,000 to 75,000 solid steel wheels of one make are in service on that road and the results thus far obtained indicate that there should be a close agreement on carbon. Robert W. Hunt was of the opinion that there was no satisfactory basis for standard specifications for solid steel wheels, a comparatively new product, and he suggested that it be permitted to fight its own battle until further information could be obtained, particularly relating to the wheels in service. One of tthe members associated with the New York Central railroad stated that it had not been found necessary to mate wheels differing only 0.05 per cent in carbon, as this slight variation has no appreciable effect on the wear of the two wheels. To facilitate mating, the percentage of carbon in the steel is stamped on each wheel. Notwithstanding the fact that the committtee had considered solid steel wheel specifications for more than two years, the proposed standards for passenger and freight car service were referred back for further investigation, particularly of the wear of the wheels in service.

As these are the first specifications for solid steel wheels, the proposed standard for wheels for freight car service, which does not differ very materially from the specification for wheels for passenger service, appears elsewhere in this report.

The proposed standard specifications for heat-treated carbon steel axles, shafts and similar parts and specifications for steel reinforcement bars were favorably acted upon and will be referred to the members for letter ballot. Action on proposed revised standard specifications for locomotive cylinders was deferred. Proposed standard magnetic tests of iron and steel were also submitted. In drawing up their specifications the metric system was adopted and the committee reported that these specifications, as far as is consistent with the best American practice, agree with the recommendations of the Hysterse-Kommission of the Verband Deutscher Elektrotechniker, which are the only specifications of methods of magnetic testing adopted by any national association.

Specifications for Non-Ferrous Metals.

Specifications for virgin spelter submitted divide that product into four grades, as follows: High grade, intermediate, brass special and prime western. The high grade shall not contain over 0.07 per cent lead; not over 0.03 per cent iron and not over 0.05 per cent cadmium and the sum of these impurities shall not exceed 0.10 per cent. Intermediate spelter shall not contain over 0.20 per cent lead, 0.03 per cent iron and 0.50 per cent cadmium, the total of these impurities not to exceed 0.50 per cent. Brass special shall not contain over 0.75 per cent lead, 0.04 per cent iron and 0.75 per cent cadmium and the total of these impurities shall not exceed 1.20 per cent. Prime western spelter shall not contain more than 1.50 per cent lead and 0.08 per cent iron. Specifications for manganese bronze ingots and copper wire bars, cakes, slabs, billets, ingots and ingot brass were also presented.

Annealing Practice.

A motion to submit to the members for letter ballot, the report of committee A-4 on "Practice recommended for annealing miscellaneous rolled and forged carbon steel objects," precipitated considerable discussion. It was contended by some of the members that suggested practice does not conform to the principles upon which the society is founded and that the reference of the report in this form to the membership would establish an undesirable precedent. The report was not in the complete form of a proposed specification and it was ex-

Standard Specifications as Standards of Reasonableness*

By improving methods of testing we teach the manufacturer how he may most wisely test his product so as to know most readily and most surely that he is truly serving the buyer and through the buyer the great world which the buyer in turn serves that his product really has the qualities which fit it for the service of the user. By this same step we enable the user to learn most readily and surely that his purchase really has the qualities which will enable him, by its use, to serve the public efficiently.

By setting up standard specifications to serve as standards of reasonableness, of what is just and proper, of what safeguards the buyer with the least hardship to the maker, we do two things.

First, we teach both parties what specific qualities each given product needs in order that it may best fit its use. We help the maker to give surely and the buyer to require firmly those specific qualities which will fit the product for its future service, so that that product may the better serve that fraction of mankind which its final users form.

Second, we help maker and buyer to agree. We find them, human fashion, each glaring fixedly at that side of gold and silver shield which faces them, one firm in his belief that it is gold, the other swearing that it is silver. Having looked the shield all over, we induce each to take a peep round the corner and see its other side. We do our share of the great work of the twentieth century, the substitution of co-operation for combat. By helping both parties to see both sides of the question, to see the true needs of the public which, in the end, we all serve, we help both parties to approach and at least to attain the attitude of co-operation in striving toward their common true interest, to serve that public the best.

I invite your attention to our lack of means of determining by laboratory test the power of materials to endure the conditions of service. There are certain properties which we need in service, and certain other properties which we can determine readily in our laboratories. For instance, in service we need resistance to abrasion under heavy pressure; this we cannot determine readily in our laboratories, but we can determine hardness by indentation and many like rapid methods. We attempt to use these rapid laboratory methods for determining fitness for service; but we cannot do this quantitatiyely because the results of the two are not convertible. That one of two steels resists indentation or scratching better than the other, or that it is harder under any other laboratory test, is or has till lately been no sure sign that it was the better fitted to resist abrasion in the track. The two properties are not convertible. Or, if they are convertible qualitatively, they are not quantitatively; and the scientific solution of such a problem requires that the indications of the laboratory reception test shall be convertible quantitatively into terms of power to endure the conditions of service.

*From the annual presidential address delivered before the American Society for Testing Materials, by Dr. Henry M. Howe.

plained that it was presented as recommended practice to permit of some latitude in this work. Dr. Henry M. Howe, chairman of the committee, urged the reference of the report to letter ballot and this motion finally prevailed.

The recommended practice for annealing rolled and forged carbon steel objects is given in abstract, as follows:

In heating large objects, the interior of which lags behind that of the outside, the final approach to the annealing temperature arrived at should be slow, so that the interior may be brought fully up to it without carrying the exterior far beyond it. An exposure of one hour should be long enough for pieces 12 inches thick. Thicker pieces need a longer heating.

For all important work, in careful hands, the use of a pyrometer is strongly recommended, but most pyrometers should be checked frequently against some standard. Wherever practicable, the part of the pyrometer which is supposed to reach the temperature of the object heated should be in immediate contact with that object, and should be protected from the flame or other source of heat by a suitable insulation.

In working without a pyrometer and relying on the eye, the light surrounding the furnace should be dull, and should be kept as nearly constant as practicable.

The annealing temperature for steel containing between 0.50 and 0.90 per cent of carbon is that at which the metal suddenly ceases to be magnetic.

In general, the higher the carbon content, the lower should be the annealing temperature.

The following ranges of temperature should be used for the several ranges of carbon content indicated; for steels with a manganese content greater than 0.75 per cent, slightly lower temperatures suffice:

Range of carbon, per cent.	Range of annealing temperature, degrees, Cent.
Less than 0.12	875 to 925
0.12 to 0.29	840 to 870
0.30 to 0.49	815 to 840
0.50 and over	790 to 815

Care should be taken that all parts of the object reach the same temperature, and it may be necessary to mask from the heat, by means of bricks, the thinner parts of the objects of varying thickness. The flame should never be allowed to touch any part of the object under treatment.

In cooling, the general principle is that the higher the carbon the slower the cooling; the slower the cooling the softer and more ductile the metal will be, and the lower will be its tensile strength, elastic limit and yield point. The greatest softness and ductility are had at a certain sacrifice of strength and elasticity, and the greatest strength and elasticity are had at a certain sacrifice of softness and ductility.

Objects containing more than 0.50 per cent of carbon should cool more slowly until the color dies out, say at 500 degrees Cent., by leaving them in the furnace. They may then be removed and cooled in the air. Thin objects containing between 0.25 and 0.50 per cent of carbon should be treated like those of 0.50 per cent of carbon, unless they can be so massed together that their collective bulk will retard their cooling.

Special Annealing Methods.

Annealing methods to obtain special qualities such as great softness and ductility, great tensile strength and high elastic limit and a high combination of ductility with tensile strength and elastic limit, are included also in the practice recommended.

For the very highest elastic limit and tensile strength, anneal at 500 to 650 degrees Cent.

For intermediate tensile strength, elastic limit and ductility, anneal at 600 to 650 degrees Cent.

For the greatest ductility with good strength and elastic limit, anneal at from 725 to 750 degrees Cent.

To remove the effects of rolling or otherwise working the object in the cold, it should be heated to about 775 degrees Cent., and cooled with a slowness which should increase with the thickness, that is, the least dimension of the pieces. Heating thin plates to 775 degrees Cent., followed immediately by slow cooling, should suffice. In the case of thick forgings, the sojourn at 775 degrees Cent. may be

Proposed Standards Specifications for Forged and Rolled, Forged or Rolled Solid Steel Wheels for Freight Car Service.

1.—Steel for wheels shall be made by the open hearth process.

2.—The ingots from which the blanks are made must have sufficient discard to insure freedom from injurious pipe and segregation.

3.—The steel for wheels shall conform to the following limits in chemical composition:

	Per cent.
Carbon	0.60 to 0.85
Manganese	0.50 to 0.80
Silicon	Not to exceed 0.35
Phosphorus	Not to exceed 0.06
Sulphur	Not to exceed 0.06

4.—Drillings from small test ingot cast with the heat shall be taken to determine whether the heat is within the limits of chemical composition specified. For check analysis the purchaser has the right to take drillings from any two points in the plate on radii at right angles to each other of any one wheel from each heat, but not at any point where the usefulness of the wheel will be impaired; drillings to be clean and free from scale, oil and dirt; and this check analysis may, at the option of the purchaser, be made from mixed drillings taken entirely through the plate at the two points.

5.—When required, the purchaser or his representative is to be furnished an analysis of each heat from which rolled wheels are made, such analysis to cover elements specified in paragraph 3.

6.—All wheels must be free from injurious seams, cracks, laminations or other imperfections detrimental to strength or service.

7.—Wheels may be furnished with contours as rolled and shall conform to dimensions specified within the following tolerances:

Height of Flange.—The height of flange shall not be more than $\frac{3}{32}$ inch over nor more than $\frac{3}{32}$ inch under that specified.

Thickness of Flange.—The thickness of flange shall not vary more than $\frac{1}{32}$ inch over or under that specified.

Throat Radius.—The throat radius shall not vary more than $\frac{1}{16}$ inch over or under that specified.

Thickness of Rim.—The rim may vary in thickness, but the variation less than the specified thickness shall not exceed $\frac{3}{16}$ inch. The thickness of rim shall be measured at the center line of tread.

Width of Rim.—The width of rim shall not be more than $\frac{1}{8}$ inch less nor more than $\frac{1}{4}$ inch over that specified.

Thickness of Plate.—The plate may vary in thickness, but the variation less than the specified thickness shall not exceed $\frac{1}{32}$ inch for each $\frac{1}{8}$ inch in the thickness of plate.

Limit Groove.—Where limit groove is called for, the location of the center of limit of wear groove shall not vary more than $\frac{1}{16}$ inch from that specified and its distance from the inner edge of the rim at the thinnest point shall not be less than $\frac{11}{16}$ inch.

Diameter of Bore.—The diameter of rough bore shall not be more than $\frac{1}{16}$ inch greater nor more than $\frac{1}{8}$ inch less than specified. When not specified the rough bore shall be $\frac{1}{4}$ less in diameter than the finished bore, subject to the above limitations.

Hub Diameter.—The hub diameter may vary, but the thickness of wall of the finished bored hub shall not be less than $1\frac{1}{8}$ inches at any point unless otherwise specified, and shall not vary more than $\frac{1}{2}$ inch at any two points on the same wheel.

Hub Length.—The length of hub shall not vary more than $\frac{1}{8}$ inch over or under that specified.

Depression of Hub.—The depression of hub from front face of rim shall not be less but may be $\frac{1}{8}$ inch more than that specified.

Black Spots in Hub.—Black spots in the rough bore shall not be longer than 2 inches nor deeper than $\frac{1}{8}$ inch. Black spots longer than 2 inches or deeper than $\frac{1}{8}$ inch will not be permitted in rough bore within 2 inches of either face.

Eccentricity of Bore.—The eccentricity between the tread at its center line and the rough bore shall not exceed $\frac{1}{8}$ inch.

Block Marks on Tread.—The maximum height of block marks must not be greater than $\frac{1}{64}$ inch.

Rotundity.—All wheels shall be gaged with a ring gage, and the opening between the ring gage and tread at any point shall not exceed $\frac{1}{8}$ inch.

Plane.—Wheels shall be gaged with a ring gage placed concentric with and perpendicular to the axis of the wheel. All points on the back of the rim equidistant from the center shall be within a variation of $\frac{1}{32}$ inch from the plane of the gage when so placed.

Tape Sizes.—Wheels shall not vary more than five tapes under nor nine tapes over the size called for by the drawing.

Mating.—All wheels shall be measured with a tape based on the standard M. C. B. tape, with tape divisions $\frac{1}{8}$ inch apart. The tape numbers shall be stenciled in plain letters on each wheel. Wheels must be mated to tape sizes and shipped in pairs. A variation of one tape will be allowed in the same pair.

8.—Wheels shall be stamped with the maker's brand and number in such a way that each wheel may be readily identified.

9.—The inspector representing the purchaser shall have free entry to the works of the manufacturer at all times while his contract is being executed. All reasonable facilities shall be afforded the inspector by the manufacturer to satisfy him that the wheels are being furnished in accordance with the contract. All tests and inspection shall be made at the place of manufacture prior to shipment and shall be so conducted as not unnecessarily to interfere with the operation of the mill.

prolonged for several hours, though always at the cost of superficial decarbonizing.

Steel containing less than 0.15 per cent of carbon should be annealed at 900 degrees Cent. Great brittleness may be caused by annealing very low carbon steel in the neighborhood of 700 degrees Cent. after cold-working.

International Specifications.

The method of procedure to be followed in the adoption of international specifications for materials was discussed by Dr. Henry M. Howe in his presidential address, delivered Tuesday evening. The advantages and disadvantages of the direct and the stamping or indirect method of arriving at international specifications were pointed out and the task of formulating these standards was characterized as a very difficult one, calling for great patience, tact, breadth of view and constructive statesmanship. That portion of Dr. Howe's address bearing on international specifications is, in part, as follows:

In order that a set of specifications shall be international, they must be accepted by the great nations concerned, and hence must be acceptable to those nations. A first step towards the construction of specifications which should thus be acceptable is to learn precisely wherein and how the dominant specifications of the several nations differ, in order that methods of bridging those differences may be studied. To this end, specifications representative of the practice of the chief industrial nations have been analyzed, and their elements have been set up in parallel columns, in order that their differences might be the more readily seen. This done, our choice seems to lie between what may be called the direct and the stamping or indirect method of arriving at international specifications.

The direct method is to select as an entering wedge some object the existing specifications for which differ but little among the different producing nations, and try to draw up a single set of specifications which shall be acceptable to all these nations. Where the initial difference is the least, there should the work of bridging it be the least.

The indirect or stamping plan, as I understand it, is first to select, as before, some important object on which agreement should be most readily reached. Second, to create or select from among the several specifications for that object in use in each of the great producing countries, a single national specification which is fairly representative of the practice of that country, and, therefore, is acceptable to it; and to stamp on it an endorsement in the name of the International Association for Testing Materials, certifying that it is representative of the export practice of that country. This limitation to export practice is made because the chief purpose of international specifications is to facilitate export trade. Third, after these several national specifications shall have been in use long enough to become effective standards, to derive from them a single international specification. I call this the indirect method, because instead of proceeding straight to setting up international specifications, it first sets up single national ones, with the purpose of using them later as scaffolding for international ones. Not only is this plan attractive in itself, but it derives weight from being that selected by those very expert in the matter, one of the committees in charge. But, however great the weight of their authority, the matter is so vital that we may well look at it also from the point of view of those who criticize it. Their criticism bears on the step of stamping the endorsement of the International Association for Testing Materials on single national specifications. This step is scaffolding for the purpose of facilitating the later work of agreeing on international specifications; and it is to facilitate this agreement by simplifying the conditions under which it will later be attempted. The ulterior purpose of the step, then, is to facilitate; the immediate purpose is to simplify, because simplicity will facilitate. Let us look at it then under these two aspects, first simplification; second, facilitation.

To select from among the many co-existing specifications of each country a single one, to stamp it with approval, to strengthen it thus so that it may displace the other competing specifications of that country, and thereby to lessen the number of specifications which will later have to be reckoned with when the time finally comes for agreeing on a single international specification which is to re-

Proposed Standards Specifications for Heat-Treated Carbon Steel Axles, Shafts, and Similar Parts.

1.—Steel under this specification shall be made by the open hearth or other approved process.

2.—A sufficient amount of discard must be made from each ingot to insure freedom from piping and undue segregation.

3.—The steel shall conform to the following limits in chemical composition:

	Per cent
Carbon	Not over 0.60
Manganese	0.40 to 0.80
Phosphorus	Not over 0.05
Sulphur	Not over 0.05

4.—Drillings shall be taken from the crop end of one axle, shaft, or similar part from each melt represented, parallel to the axis on any radius one-half the distance from the center to circumference, to determine whether the chemical composition of the heat is within the limits specified.

In addition to the complete analysis, the purchaser has a right to call for a phosphorus determination, to be made from turnings from each tensile test specimen, and the phosphorus must show within the limits called for by paragraph 3.

5.—The steel shall conform to the following minimum physical properties:

Ultimate strength, lbs. per sq. in.	85,000
Elastic limit, per sq. in.	50,000
Elongation in two inches, per cent.	22
Reduction of area, per cent.	45

The elastic limit shall be determined by extensometer. Above 40,000 pounds per square inch, each increment of load shall be not more than 1,000 pounds per square inch.

6.—The test specimen, 0.5-inch diameter and two-inch gage length, shall be used to determine the physical properties as specified in paragraph 5. Test specimens shall be taken from the crop end of one axle, shaft, or similar part, from each treating plant heat; if more than one open hearth heat is represented in a treating plant heat, a test shall be taken from each open hearth heat represented. A full-size prolongation shall be left on each axle, shaft or similar part.

7.—A cold bend test shall be made from the crop end of one axle, shaft, or similar part, from each treating plant heat; if more than one open hearth heat is represented in a treating plant heat, a test shall be taken from each open hearth heat represented. The test shall be made with a one-half inch square specimen, not exceeding six inches in length, around a flat mandrel with edges of one-half-inch radius, and the specimen shall bend, without fracture, 180 degrees around the said mandrel.

8.—Specimens for tensile test and cold bend test shall be taken parallel to the axis of the axle or shaft and on any radius one half the distance from the center to the circumference.

9.—In case the physical results obtained from any lot of axles, shafts, or similar parts, do not conform to those called for by paragraphs 5 and 7, the manufacturer shall have the privilege of re-treating such parts, from which new tests shall be taken by the purchaser, and these shall govern the acceptance or rejection of the lot.

10.—Each axle, shaft, or similar part shall be allowed to cool after forging, shall then be re-heated to the proper temperature, quenched in some medium, allowed to cool, and then re-heated to the proper temperature for annealing.

11.—Warped axles or shafts or similar parts must be straightened hot; that is, at a temperature above 900 degrees Fahr., and before offering the parts for test.

12.—All axles, shafts, and similar parts shall be free from cracks, flaws, seams or other injurious imperfections when finished. Those which show such defects while being finished by the purchaser will be rejected and returned to the manufacturer, who must pay return freight.

13.—All axles, shafts and similar parts must be rough-turned with an allowance of ⅛-inch on surface for finishing, except on collar, which is to be left rough-forged. Turning must be done on 60 degree centers with clearance drilled at point.

14.—The heat number shall be stamped on the rough-forged collar. After rough-turning, the manufacturer's name, heat number, individual axle or shaft number, and inspector's mark shall be stamped at place indicated by the purchaser, except at any point between the rough collars.

15.—The inspector representing the purchaser shall have free entry, at all times while his contract is being executed, to all portions of the manufacturer's shop which concerns the manufacture of material ordered. All reasonable facilities shall be afforded to the inspector by the manufacturer to satisfy him that the axles, shafts, and similar parts are being furnished in accordance with the specifications. All tests and inspection shall be made at the place of manufacture prior to shipment and free of cost to the purchaser. The purchaser shall have the right to make tests to govern the acceptance or rejection in their own test-room, or elsewhere, as may be decided by the purchaser, such test, however, to be made at the expense of the purchaser and to be made prior to the shipment of the material. Unless otherwise arranged, any protest based on such tests must be made within six days, to be valid. Tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the mill.

place the several national ones, is to simplify the environment in which this final agreement will be attempted. It simplifies the situation by eliminating most of the competing specifications, and bringing to a minimum the number of those which are later to be brought into harmony. I do not see how this inference can be disputed.

Objections to Stamping Plan.

But when we come to the ulterior purpose of the step, facilitation, the matter is far less clear. Many fear that the step will not facilitate but oppose final agreement; that it is based on a confusion of ideas, pointing out that the really difficult task is to harmonize, not specifications but men; that you cannot strengthen one set of Nation *A's* specifications in such a manner that it expels and excludes the others of Nation *A* without at the same time strengthening it so that it will the more effectively resist the later attempt to displace it in favor of an international specification; that to induce each of the several little scattered bands of country *A* to throw down its own little standard and unite with the others about a single national standard is to weld them into a compact whole which will fight the more stubbornly and effectively for that standard, not only against the standards of countries *B*, *C* and *D*, but against any standard, national or international, less favorable to their interests.

A second objection, a much more serious one, and one of a wholly different nature, urged against the feature of the proposed stamping plan is that it endorses with the authority of the International Association for Testing Materials each of several competing specifications and that an endorsement, no matter how carefully it is worded and qualified, is after all an endorsement, a ready means of misleading importers in the countries to which we export, especially because their remoteness hinders their recognizing the intended limitations of the endorsement. In order to understand the position we must have clearly in mind the distinction between several national specifications first to be erected as scaffolding, and the single international specification later to be erected on that scaffolding. The criticisms to which I call your attention touch not on the ulterior work of erecting international specifications on the scaffolding of single national ones, but the erecting and endorsing of the single national ones.

In order to gain the assent of a given nation to such an endorsement of a single national specification as truly representing its own practice and product as distinguished from those of other countries, that endorsement must needs be identical in wording with the endorsements stamped on the specifications selected as representing the other nations, because any variation in the wording of the endorsement would be stoutly resisted as discriminating between these several countries in favor of one or against another. In short, identity of endorsement seems a necessary part of this stamping plan.

Identical Endorsement.

Many believe that any identical endorsement which can be framed must necessarily be open to this objection, that its identity must appear to endorse the products of the several countries as of equal merit. That is the essence of the objection. It is feared that the result of this identical endorsement of the laxer and of the more stringent specifications, of those which safeguard the buyer the most weakly alongside of those which safeguard him the most strongly, will be to give to the nation of the laxer specification an improper advantage and to throw an additional and improper obstacle in the path of those whom we fain would aid, those who safeguard the buyer the most thoroughly.

The principle is that which underlies Gresham's law, that the attempt to keep in circulation two currencies of different intrinsic values results in the expulsion of the dearer. The history of finance has proved the truth of this law to those to whom it is not self-evident.

This objection to the plan of identical endorsement furnishes the most serious argument against the stamping plan. In my opinion it must be fully and fairly met before success can

Proposed Standard Specifications for Steel Reinforcement Bars.

1.—Steel may be made by either the open-hearth or Bessemer process. Bars shall be rolled from billets.

2.—The chemical and physical properties shall conform to the following limits:

Properties considered.	Structural steel, grade.		Hard grade.*		Cold-twisted bars.
	Plain bars.	Deformed bars.	Plain bars.	Deformed bars.	
Phosphorus, max.—Bessemer	0.10	0.10	0.10	0.10	0.10
Open-hearth	0.05	0.05	0.05	0.05	0.05
Ultimate tensile strength, pounds per square inch	55,000-70,000	55,000-70,000	80,000 min.	80,000 min.	Recorded only
Yield point, min., pounds per square inch	33,000	33,000	50,000	50,000	55,000
Elongation, min. per cent in 8 inches	1,400,000 / tens. str.	1,250,000 / tens. str.	1,200,000 / tens. str.	1,000,000 / tens. str.	5 per cent.
Cold bend without fracture:					
Bars under ¾ inch in diameter or thickness	180°d. = 1t.	180°d. = 1t.	180°d. = 3t.	180°d. = 4t.	180°d. = 2t.
Bars ¾ inch in diameter or thickness and over	180°d. = 1t.	180°d. = 2t.	90°d. = 3t.	90°d. = 4t.	180°d. = 3t.

* The hard grade will be used only when specified.

3.—In order to determine if the material conforms to the chemical limitations prescribed herein, analysis shall be made by the manufacturer from a test ingot taken at the time of the pouring of each melt or blow of steel, and a correct copy of such analysis shall be furnished to the engineer or his inspector.

4.—Chemical determinations of the percentage of phosphorus, shall be made by the manufacturer from a test ingot taken at the time of the pouring of each melt of steel and a correct copy of such analysis shall be furnished to the engineer or his inspector. A check analysis may be made by the purchaser or his representative, in which case an excess of 25 per cent, above the required limits will be allowed.

5.—For the purposes of these specifications, the yield point shall be determined by careful observation of the drop of the beam of the testing machine, or by other equally accurate method.

6.—Tensile and bending test specimens may be cut from the bars as rolled, but tensile and bending test specimens of deformed bars may be planed or turned for a length of at least nine inches if deemed necessary by the manufacturer in order to obtain uniform cross-section.

Tensile and bending test specimens of cold-twisted bars shall be cut from the bars after twisting, and shall be tested in full size without further treatment, unless otherwise specified as in (c), in which case the conditions therein stipulated shall govern.

If it is desired that the testing and acceptance for cold-twisted bars be made upon the hot-rolled bars before being twisted, the hot-rolled bars shall meet the requirements of the structural steel grade for plain bars shown in this specification.

7.—At least one tensile and one bending test shall be made from each melt of open-hearth steel rolled, and from each blow or lot of ten tons of Bessemer steel rolled. In case bars differing ¾ inch and more in diameter or thickness are rolled from one melt or blow, a test shall be made from the thickest and thinnest material rolled. Should either of these test specimens develop flaws, or should the tensile test specimen break outside of the middle third of its gaged length, it may be discarded and another test specimen substituted therefor. In case a tensile test specimen does not meet the specifications, an additional test may be made.

The bending test may be made by pressure or by light blows.

8.—For bars less than $\frac{7}{8}$ inch and more than ¾ inch nominal diameter or thickness, the following modifications shall be made in the requirements for elongation:

For each increase of ⅛ inch in diameter of thickness above ¾ inch, a deduction of one shall be made from the specified percentage of elongation.

For each decrease of $\frac{1}{8}$ inch in diameter or thickness below $\frac{7}{8}$ inch, a deduction of one shall be made from the specified percentage of elongation.

The above modifications in elongation shall not apply to cold-twisted bars.

9.—Cold-twisted bars shall be twisted cold with one complete twist in a length equal to not more than twelve times the thickness of the bar.

10.—Material shall be free from injurious seams, flaws, or cracks, and have a workmanlike finish.

11.—Bars for reinforcement are subject to rejection if the actual weight of any lot varies more than five per cent over or under the theoretical weight of that lot.

12.—When an inspector is furnished by the purchaser to inspect material at the mills, he shall have full access, at all times, to all parts of mills where material to be inspected by him is being manufactured.

Proposed Standard Specifications for Manganese Bronze Ingots.

1.—This specification is intended to cover manganese bronze ingots, having notched flat bottoms, approximately 3 by 2¾ inches wide by 12 inches long, properly tapered to strip easily from an iron mold. Chemical composition:

	Per cent.
Copper	55 to 60
Zinc	39 to 45
Tin not over	2
Aluminum not over	0.5
Manganese not over	0.5
Iron not over	2

2.—The ultimate tensile strength shall be not less than 70,000 pounds per square inch.

The elongation in 2 inches shall be not less than 20 per cent.

3.—A standard turned test specimen, 0.5 inch in diameter and 2 inches gage length, shall be used to determine the physical properties as specified above.

4.—One test ingot shall be selected by the inspector to represent 10,000 pounds of ingots or fraction thereof. The test specimen shall be cut from one corner near the bottom of the ingot. In case the test specimen shows a flaw, two additional tests may be selected by the inspector from the same lot, and tested to represent the lot in question.

5.—Each furnace charge shall be kept separate until the lot is sampled by the inspector, and each ingot thereof stamped with its proper heat number. When the ingot is sampled at destination, various heats can be mixed in shipment, but must be stamped with their proper heat number.

6. All ingots in each lot will be accepted or rejected upon the physical tests irrespective of the heat or heats from which the test ingots are selected.

In case the buyer's tests show the material does not meet these specifications, the sellers shall have an opportunity to inspect the material, and each party shall select a sample for retest. If the results do not agree, each shall select a sample to be sent to a mutually agreeable umpire, whose decision shall be final. The costs of such retest shall be paid by the loser.

be expected. I do not say that it cannot be met. But it is not enough that you and I should be convinced that the wording of a given endorsement could not be used to give undue support to the laxer specification. The parties in interest in other countries must be convinced. Thus far they have not been. If wording can be devised which would, in the opinion of these parties, be free from this objection it would remove this, the really serious obstacle to the adoption of the stamping plan. The best way to show that such an endorsement can be devised is to devise it; and as one who has the movement very close to his heart I urge on those who advocate the stamping plan to proceed immediately to remove this objection to it by devising such an endorsement. I fear that, until this is done, all attempts to forward that plan will meet strong opposition.

The executive committee was authorized to appoint a special committee for the purpose of formulating rules to govern the form, but not the substance of standard specifications. At the present time the specifications of the society are not similar in form, and it is with a view to standardizing the form of these specifications that this work has been undertaken.

Ingot Iron.

Allerton S. Cushman, in a paper entitled "The Manufacture of Pure Irons in Open-Hearth Furnaces," directed attention to a new metallurgical development which has tremendous possibilities and the product, varied and important applications. Pure iron, or ingot iron, as it is termed in the iron and steel trade, has not been manufactured into all of the products that are customarily made of steel, charcoal and puddled iron, but it has been successfully rolled into billets, slabs, plates, sheets, merchant iron, wire, nails, pipe and boiler tubes. A wide variety of forgings has also been produced. In tensile strength, pure iron closely approximates high grade charcoal iron, and in elongation and reduction of area, it not only equals, but in many cases surpasses the finest soft steel. The approximate purity of this ingot iron is best indicated by the following minima and maxima of six analyses which were made with great care and are extremely accurate: Silicon, 0.002-0.006 per cent; sulphur, 0.014-0.019 per cent; phosphorus, 0.001-0.005 per cent; carbon, 0.008-0.02 per cent; manganese, trace—0.025 per cent; oxygen, 0.016-0.024 per cent; copper, 0.02-0.08 per cent; aluminum, trace-0.013 per cent, and nitrogen, 0.003-0.007 per cent. Mr. Cushman's paper is given briefly herewith:

Pure iron made in an open-hearth furnace has become generally known in this country and to a certain extent in Europe as *ingot iron.* This term originated many years ago and was applied chiefly to the lower carbon product of the Bessemer converter and the open-hearth furnace. Of late years, however, it has fallen into disuse and from the standpoint of the steelmaker it was undoubtedly a misnomer, so that gradually the term mild or soft steel took its place. Low carbon Bessemer or open-hearth steel, which usually carries from 0.3 to 0.5 per cent of manganese, or over, is not iron, for the simple reason that it does not show the true ferrite structure and contains enough carbon to provide it with mild hardening qualities. Besides these facts, mild steels possess many qualities not possessed by iron and may be used for purposes for which iron would be unsuitable, although this applies more especially to the slag-bearing iron as made by the original processes. On the other hand, a pure slagless iron is probably superior for many other purposes to the general run of carbon-bearing metals. It would appear that the term *ingot iron* is especially suitable to a pure iron product made in an open-hearth furnace and cast while molten into ingot form.

Manufacturing Process.

The manufacture of pure iron in the open-hearth furnaces in its entirety is undoubtedly a distinctly new development, in spite of the fact that the process has a great many points in common with the open-hearth production of mild steel. In the case of the iron the oxidizing operation under highly basic conditions is carried forward to an abnormal extent. It is not too much to say that the effort is made to do what has generally been conceded to be bad practice in an open-hearth furnace, that is to say, the metal is deliberately over-burned. This treatment yields a bath of metal and slag heavily charged with gas and in a highly super-oxidized condition. The

Proposed Revised Standard Specifications for Locomotive Cylinders.

1.—Locomotive cylinders shall be made from good quality, close-grained gray iron, cast in a dry mold.

2.—Drillings taken from test pieces as hereafter mentioned shall conform to the following limits in chemical composition:

	Per cent.
Phosphorus	Not over 0.90
Sulphur	Not over 0.10

In case of rejection on this analysis, the manufacturer shall have the option of analyzing drillings from the bore of the cylinder, upon which analysis the acceptance or rejection of the cylinder shall be based.

At the option of the purchaser, two test bars, each 1¼ inches in diameter and about 14 inches long, may be cast for each cylinder. When placed horizontally upon supports 12 inches apart and tested under a centrally applied load, these test bars shall show an average transverse strength of not not less than 3,000 pounds, and an average deflection not less than 0.09 inches.

The above test pieces shall be cast on end in dry sand, the metal being taken from the ladle before pouring into the cylinder mold.

Before pouring, a sample of the iron shall be taken from the ladle and chilled in a cast iron mold.

The sample shall be allowed to cool in the mold until it is dark red, or almost black, when it shall be knocked out and quenched in water. The sample, on being broken, must show a close-grained, well mottled gray iron, with a well defined border of white iron at the bottom of the fracture.

Castings shall be smooth, well cleaned, free from blow holes, shrinkage cracks, or other defects sufficiently extensive to impair the value of the casting, and must finish to blue print size.

Each cylinder shall have cast on each side of the saddle the manufacturer's mark, serial number, date made, and mark showing order number.

The inspector representing the purchaser shall have all reasonable facilities afforded to him by the manufacturer to satisfy himself that the finished material is furnished in accordance with these specifications. All tests and inspections shall be made at the place of the manufacturer.

elimination of the carbon and manganese to such low percentages that they amount to no more than traces makes this super-oxidation a necessary step in the process. Having obtained the desired purity with respect to these elements the bath is given a heroic treatment, whereby a thorough deoxidation takes place, the gas being at the same time satisfactorily eliminated. No difficulties of any importance are encountered in the pouring of the metal into the ingot molds. It would naturally be expected that such treatment as described might yield a wild metal difficult to handle in the pouring but this is not the case if the work has been satisfactorily performed. As a matter of fact, the resulting ingots of this process not only possess great purity, but are as free from oxygen and gas as any ingots produced from well made mild steel. If the oxygen and gases are not properly eliminated the quality of the metal is very materially impaired.

Tonnage Possibilities.

The manufacture of pure iron in open-hearth furnaces when the process is properly carried out presents serious, but not insurmountable difficulties in the furnace, the pouring and the working. It is necessarily a more expensive process than that of soft steel manufacture, owing to the necessary prolongation of the heat and the higher temperature required during the latter stage of the operation. For these reasons, labor, furnace repairs, ladle linings, fuel charges, and the item of metallurgical waste must all be necessarily in excess of those encountered in the making of soft steel.

The process, however, holds forth the same tonnage possibilities as in the making of mild steel, and it permits of the making of iron on a basis comparable to the high pressure methods employed in modern steel manufacture. It also, in contradistinction to the previous methods of iron manufacture, permits of the making of iron in very large masses, and the subsequent rolling of the same in a manner similar to that of mild steel. It is a well known fact that the greater the amount of work that is given to iron or steel, the more superior will be the resulting product. This permits the making of commercial products out of iron that have been customarily made of steel owing to the steel's superior workability when compared with iron made by the earlier methods. Such a method for the production of iron, with practically the same equipment as is used in the production of steel, and with substantially the same tonnage possibilities, coupled with a cost not seriously greater than that of steel, certainly seems most desirable and it has, with good reason, been favorably received by the consumers of this country.

Physical Properties.

Considerable attention has been paid to the physical properties of this new iron, and comparisons between it and steel and the purer forms of wrought iron have been made. In tensile strength it closely approximates high grade, well-rolled charcoal iron, and in elongation and reduction of area it not only equals, but in many cases surpasses the finest soft steel. It is a well known fact that iron is usually inferior to steel in elongation and reduction of area. Owing to its more steel-like qualities in this respect, therefore, pure open-hearth iron becomes available for deep drawing and stamping purposes where very often ordinary wrought iron is unavailable and steel must usually be employed. The pure ingot irons, while perhaps not equal to mild steel under certain strenuous conditions, in most cases proved themselves to be adaptable. In fact, it is claimed for them that they appear to combine to a high degree the good qualities of both iron and steel, with a comparative absence of at least some of the undesirable qualities of each. The annealing, as well also as the temperature at which the metal is delivered from the rolls, the rapidity of cooling, will all, of course, just as in the case of steel, exert a marked influence on the tensile strength, reduction of area, and elongation. In brief, it is safe to state that the tensile strength lies between that of iron and mild steel, the reduction of area being usually higher than mild steel, and the elongation about the same as mild steel.

A fairly wide range of variation of elongation and reduction of area is found to be dependent upon minor variations in the deoxidizing and purification treatment. Following the disappearance from the metal of the five ordinary impurities usually taken account of, the temperature at the completion of rolling, together with the rapidity of cooling, exerts a marked effect.

Corrosion of Pure Iron.

The fact that very pure irons show a high resistance to the acid test has very naturally been used as an argument in their favor. The consensus of opinion among investigators of this subject seems to be that the acid test should not be used as a true measure of corrosion resistance under service conditions. While much can be said in support of this point of view and while the writer does not believe that the acid test should be made the sole basis for specification, he has not the slightest hesitancy in recording the fact, that other things being equal, he would advise the purchase of material that showed well in the acid test, provided the prime consideration under the conditions of service was durability and longevity of the material.

Ingot Iron and Soft Steel.

In opening the discussion of this paper, Dr. Howe deplored the use of the term *ingot iron* and expressed the belief that its addition to iron and steel nomenclature would result in confusion. He pointed out that it has been universally agreed that that which is cast in a malleable mass is steel and contended that so-called ingot iron should be termed a soft or low carbon steel. In reply, Dr. Cushman said that he was not in agreement with Dr. Howe, and while fully appreciating the inconvenience that might be caused by a change in nomenclature, he contended that ingot iron is a new product and should, therefore, be given a new name. "I believe it not entirely impossible to remove carbon entirely," added Dr. Cushman, "and if so, it surely should not be called steel. If we can make iron in an open-hearth furnace, why not call it iron? I will resist any attempt to call a product what it is not."

Dr. Richard Moldenke made inquiry as to the nature of "the heroic treatment, whereby a thorough deoxidation takes place, the gas being at the same time satisfactorily eliminated." Dr. Cushman explained that at the time of the writing of the paper he was not certain as to how far he could go in divulging the process, but since that time all restrictions have been removed. As stated in the paper, the metal is deliberately over-burned and this treatment yields a bath of metal and slag that is in a super-oxidized condition. This super-oxidation is necessary in the elimination of the carbon and manganese to such low percentages that they amount to mere traces. Dr. Cushman explained that after the desired purity of the metal with respect to these elements is obtained, the bath is deoxidized by the addition of pig iron in the furnace, and this constitutes the "heroic treatment" referred to in his paper. He added, further, that there is no mystery about the process, but some novelty, in that the manufacturer is doing with deliberation what others have tried to avoid. Dr. Cushman admitted that ferro-silicon had been tried at one time as the deoxidizing agent, but added that pig iron is now exclusively used. Aluminum is added to the metal in the ladle.

Elimination of Copper.

The high copper content of scrap, to which attention was directed by Dr. Cushman, precipitated considerable discussion. The copper content of scrap must be carefully considered in the manufacture of ingot iron, as high copper causes more difficulties than are experienced by steel makers from this source. When making experiments to ascertain the effect of copper on this iron, Dr. Cushman said that the manufacturers permitted him to throw copper ingots into a bath of 50 tons of metal. It was found desirable to keep the copper content as low as possible and higher than ruling prices are paid for scrap of low copper content. Referring further to Dr. Howe's objection to the use of the term ingot iron, Dr. Cushman said that if this pure iron should replace wrought iron, there would be no more iron and only steel, if ingot iron is so classified. Dr. Albert Sau-

veur made inquiry regarding the weldability of this iron and was informed that it is not only easily weldable but that it is used as a solder for welding steel by the application of a high temperature flame.

Preservative Coatings.

At the session devoted to the consideration of preservative coatings, widely divergent opinions were expressed as to the relative value of the accelerated acid test as a measure of the corrosion of iron and steel in service. The supporters and opponents of this test presented results of investigations that were conflicting in essential details and the discussion failed to develop a satisfactory suggestion or mode of procedure that might result in the harmonizing of the widely differing opinions of the value of this test. In its report to the society, the committee on the corrosion of iron and steel disclaimed any recommendation or endorsement of the acid test as a measure of natural corrosion and pointed out that any use of the name or authority of the American Society for Testing Materials in this connection is unwarranted. The position of the committee with regard to the acid corrosion test was clearly outlined in the following clause:

Notwithstanding the fact that this committee in its annual report for the year 1909 pointed out as clearly as it could that the tentative suggestions made by it in 1907 as to the conditions for carrying out the so-called acid corrosion test were not to be considered a recommendation of the test, and that the results of such test are unreliable as truly measuring the tendency to natural corrosion, the name of the American Society for Testing Materials continues to be used as having recommended the acid corrosion test, and by inference as having endorsed the same. For this reason the members of the committee again desire to disclaim any recommendation or endorsement of the acid test as a measure of natural corrosion, and to point out that any use of the name or authority of the American Society for Testing Materials in this connection is unwarranted.

Committee Divided.

It developed that the committee was divided on the adoption of this clause, but no minority report was presented. Dr. Allerton S. Cushman, chairman of this committee, and who presided during this session of the annual meeting, clearly defined his position in the controversy that has developed as to the relative value of the acid test. While opposed to the adoption of the clause, which defines the attitude of the committee on the corrosion of iron and steel, he said that he signed the report as chairman of this committee, yet his doing so, he added, in no way reflected his personal opinion as to the value of this test as a measure of corrosion. He also explained that with regard to the acid test he had an open mind and suggested that final judgment on this point be reserved.

Value of Sulphuric Acid Test.

To ascertain the value of the sulphuric acid test as a measure of corrosion, Cloyd M. Chapman exposed two plates, one of improved iron and one of common steel, to the weather for 18 months, to ascertain the result of service exposure, and later subjected material cut from these plates to the sulphuric acid test for the purpose of comparison. Mr. Chapman's report to the society is in part as follows:

The improved iron contained only minute quantities of impurities; the steel analyzed about 0.06 per cent carbon, 0.095 per cent phosphorus, and 0.38 per cent manganese. These plates were clean and new when exposed side by side on the roof of the Maritime building at the southern extremity of Manhattan. They seemed to be rather free from mill scale, but any mill scale present was left on, as it usually would be in practice. They were exposed at an angle of 45 degrees, facing south. This exposure is a rather severe one because of the fogs, smoke and the salt air from the bay, all of which are present in this locality. At the end of 18 months they were removed and their surfaces briskly brushed with a wire brush until the rust was removed and the surface of the metal brought to a polish. A careful examination of these plates fails to show any considerable difference in the corrosion and pitting which has taken place. As far as the eye can distinguish, each plate has rusted to the same extent. The depth and size of the pits formed by rust on the surfaces of these two plates are very nearly the same, but careful comparison shows slightly larger and deeper marks on the surface of the improved iron than on the surface of the common steel.

Having thus compared the ability of the two metals to withstand the action of the weather, a sulphuric acid test was made on parts of the same plates which had been exposed to the weather. Strips cut from the ends of these plates were immersed in dilute sulphuric acid until one of them was nearly destroyed, while the other had lost only 7 per cent in weight. At the end of the one hour period prescribed by the test, the improved iron had lost 0.83 per cent, while the common steel had lost 6.7 per cent.

It is quite unnecessary to point out that although weather exposure caused approximately the same amount of rusting and pitting on the two plates, yet under the acid test one was attacked several times as violently as the other.

The makers of this improved iron claim that it is much more resistant to the corroding influences usually met with in service than are any of the ordinary grades of iron or steel, and they back up their claims by citing the sulphuric acid test as an indicator of the relative resistance of their metal to corrosion under service conditions.

We do not wish to be understood as claiming that the sulphuric acid test is useless or that when properly used, it may not give useful information, but we do wish to call attention to its utter inability to give a reliable indication of the relative ability of metals to withstand the corrosive action of exposure to the weather.

This sulphuric acid test may be briefly described as follows: Samples of the metals to be tested are prepared by polishing their surfaces with fine emery, rubbing in a direction at right angles to the direction in which the metal was rolled. The size of the test piece recommended is $\frac{1}{16} \times \frac{1}{2} \times 2$ inches. After careful weighing, these small plates are immersed in a 20 per cent solution of chemically pure sulphuric acid for one hour at a temperature of 15 degrees Cent. They are then removed from the acid, washed, dried, and again weighed. The loss in weight is taken as an indication of the ability of the metal to withstand corrosive influences.

Copper as a Resistant to Corrosion.

W. H. Walker presented the results of a series of exceedingly interesting tests which indicated that the addition of small percentages of copper to steel make this metal highly resistant to corrosion. An open-hearth steel which contained 0.08 per cent carbon, 0.5 per cent manganese, 0.018 per cent sulphur, 0.017 per cent phosphorus and no copper, showed a loss of 3.70 per cent when subjected to the sulphuric acid test. After adding only 0.21 per cent copper to this same open-hearth steel, the loss, when subjected to the same sulphuric acid test was reduced to 0.12 per cent. Other tests of open-hearth steel containing 0.19 per cent copper and 0.10 per cent carbon and 0.41 per cent manganese and 0.09 per cent carbon and 0.31 per cent manganese, showed losses of 0.12 and 0.14 per cent respectively in the acid test.

Copper in Iron.

Other tests were cited to show that copper in practically pure iron makes the metal resistant to corrosion and a pure iron which contained only a trace of copper showed a loss of 18.83 per cent when subjected to the sulphuric acid test. The analysis of this iron follows: Carbon, 0.02 per cent; manganese, 0.06 per cent; sulphur, 0.035 per cent; phosphorus, 0.006 per cent, and copper, trace. Other practically pure irons subjected to the acid test, which, however, contained 0.16, 0.20 and 0.19 per cent of copper, showed losses of only 0.44, 0.59 and 0.44 per cent, respectively.

Dr. Cushman, in discussing these tests, said that they were of little value in view of the fact that the oxygen content of the steel and iron was not given. He added that very pure irons are highly resistant to acid and that they do not have to enter the alloy field to resist corrosion. It was further contended that it is a well-known fact that the addition of one-fourth of one per cent of copper to steel makes the metal highly resistant to corrosion and that very pure iron, practically free from copper, is as resistant to acid as any steel al-

loyed with copper. The supporters of the acid test presented a large amount of data bearing on the influence of the oxygen content of iron and those containing a high percentage of this element showed great losses when subjected to the sulphuric acid test. In concluding the discussion, it was recommended that a careful study be made of the acid test in order that its value as a measure of corrosion may be definitely ascertained.

Galvanized Wire Fence Tests.

Dr. Allerton S. Cushman submitted a report on the fence wire tests at Pittsburg. The wire fence consists of galvanized Bessemer steel woven wire, such as is generally used throughout the United States, which is protected by the following methods of zinc coating: Sherardized, electro-galvanized, unwiped galvanized and galvanized after fabrication. All of the fences coated by the close-wiped, hot-dip process failed in less than two years, as they had been entirely rusted for some time previous to the official inspection. Regarding recent developments in fence manufacture, the report contains the following statement:

"It is only fair, however, to the large manufacturers, who are making fencing out of galvanized steel wire, to state that they have been making great efforts to improve the quality of their product, and to increase the weight of the galvanized coating, during the past two years."

The woven wire fences, especially coated, showed good service results. A Sherardized panel, however, showed considerable rust in spots, while another panel of this fencing gave excellent results. The electro-galvanized panel and a panel made from unwiped galvanized wire have given good service results, but the committee pointed out that the results recorded are not necessarily to be taken as a recommendation of these methods of protection.

The committee also did a large amount of work during the past year on various methods for determining the weight of zinc coatings on iron and steel. It was the sentiment of the committee that the Preece copper sulphate test is unreliable and should be abandoned entirely as a basis of specification with respect to galvanized sheet and plate. In respect to wire, the Preece test has the advantage of being quick and simple, and if carried out in a proper manner, yields comparative results of value. The committee recommended the lead acetate test as preferable to the copper sulphate test for determining or specifying the weight of zinc coatings.

Preservative Coatings for Structural Materials.

S. S. Voorhees, chairman of the committee on preservative coatings for structural materials, presented a comprehensive report which included the official inspection of the steel panels, variously coated and exposed on the Havre-de-Grace bridge of the Pennsylvania railroad. The first report of this service test was made to the society in 1908, and the details of the various coatings applied are published in the *Transactions of the American Society for Testing Materials*, Vol. 8, page 173. In making the official inspection, these factors were considered: (*A*) chalking; (*B*) checking, cracking and alligatoring, and (*C*) general surface conditions. The basis of marking follows: Excellent, 10 to 8; good, 8 to 6; fair, 6 to 4; poor, 4 to 2, and failure, 2 to 0. Under *A*, the average rating of 16 paints was 8.7; four paints, 7.4, and one paint, 4.5. Under *B*, the average rating of 16 paints was 9.7; two paints, 6.6 and one paint, 2.2. Under *C*, the average rating of nine paints was 8.6; eight paints, 7.5; one paint, 5.7, and one paint, 2.3. An investigation of the bridge structure showed that it is in as good, and in the majority of cases, in better condition today than the test panels.

The reports of other sub-committees included the results of tests of linseed oil, undertaken several years ago, tests of paint vehicles, white paint tests and a preliminary report of the paint tests of the panels exposed at Atlantic City. On the basis of marking with 10 as the maximum, American vermilion and chrome green were given perfect marks and lead and zinc chromate were marked 9¾.

Interesting Paint Tests.

At the 1910 meeting of the American Society for Testing Materials, Cloyd M. Chapman presented a paper which gave the results of an extended series of exposure tests of structural steel paints conducted by Westinghouse, Church, Kerr & Co., New York. The coatings tested were divided into classes depending upon their principal ingredients and a table was presented which showed the comparative degree of protection afforded by 14 classes or groups of paints. These tests have been continued and other paints added until now more than 1,000 coatings have been exposed to the weather, spread on approximately 3,000 plates. In rating the points, the only quality considered was the protection against rust, and the results of the continued tests, as reported by Mr. Chapman, indicate that for short time protection, in such cases as the protection of steel for a few months by the application of a single coat, a red lead, white lead, or one of the chromate group, would be satisfactory. The tests further show an early and complete failure of the gilsonite and elaterite paints, which indicate the unsuitability of these materials for this particular kind of exposure, while there was a close agreement between the groups comprising the two forms of carbon, namely, the carbon and the graphite groups, the results indicate that the combination of these pigments are much less effective. Zinc oxide, it was found, compares favorably with carbon, graphite and iron oxide and white lead was found somewhat superior to any other pigment except red lead for one coat work, after either one year's or two years' exposure.

The coatings for these service tests have been spread on exceedingly small panels and some of the members questioned the accuracy of the results. It was stated that great care should be exercised in drawing conclusions from tests made on such small samples. Mr. Chapman, in reply, said that some of the tests on the small panels have been duplicated on large plates and the results were found to be uniformly consistent.

Heat-Treatment of Nickel Steel.

The results of a study of the heat treatment of low carbon nickel steels were presented by Henry Fay, who was assisted by John M. Bierer in this investigation. The nickel steel specimens selected for the tests contained 3.15 and 3.50 per cent of nickel, respectively, and were made by the open-hearth process. The bars subjected to the heat treatment were ⅞ inch in diameter and 5 inches long, and after treatment they were cut into the standard 4-inch test specimens. The heat treatment was carried on in an electrically-heated muffle furnace and each set of specimens was placed in the cool furnace, heated to the desired temperature and held at this temperature for a period of two hours. At the end of this time one was quenched in oil, a second was allowed to cool rapidly in air and the third was allowed to cool slowly in the closed furnace. All oil-quenched specimens were subsequently annealed two hours at 600 degrees Cent. All of the bars were subjected to physical tests and, in general, the oil-quenched specimens gave the highest values for tensile strength, elastic limit and reduction of area; the next highest values were given by the air-cooled specimens, and the air-cooled specimens gave the minimum values.

Other Nickel Steel Tests.

W. Campbell and H. B. Allen reported the results of tests to ascertain the proper heat treatment of a steel containing 3.15 per cent nickel and 0.27 per cent carbon. In making these tests, open-hearth steel rounds, ⅝ inch in diameter, which contained 0.65 per cent manga-

nese, and were cold drawn, were used. An outline of the research follows:

1.—Determination of critical points and of refining temperature by microstructure.

2.—Heating to various temperatures from 600 to 1,350 degrees Cent., and cooling in the air, in a furnace, quenching in water and in oil.

3.—Heating to temperature giving maximum strength, when quenched in water and oil and cooled in the air.

The large number of tests made indicate that a steel of the content previously noted may be refined by heating to 750 degrees Cent., which is about 75 degrees lower than for ordinary carbon steel. It was found that hardening is complete when quenched from this temperature, but higher tensile strength was obtained by quenching at about 900 degrees Cent. Over-heating became marked above 1,200 degrees Cent.

The tempering of bars quenched in water or oil, it was ascertained, increases the ductility and decreases the strength, the change varying uniformly with the temperature of reheating, until at 650 degrees Cent. the properties are very nearly those of the original steel, but having a slightly lower elastic limit and greater reduction of area.

Heat Treatment of Acid and Basic Steel.

An interesting report of the effect of heat treatment upon acid and basic open-hearth steel of similar composition was made by Henry Fay. The two steels had the following analyses: Acid—carbon, 0.43 per cent; manganese, 0.60 per cent; phosphorus, 0.027 per cent; silicon, 0.067 per cent, and sulphur, 0.05 per cent; basic—carbon, 0.42 per cent; manganese, 0.60 per cent; phosphorus, 0.009 per cent; silicon, 0.033 per cent; sulphur, 0.055 per cent. The bars tested were 24 x 2 x ⅜ inches. The heating was accomplished in an electrically-heated muffle furnace and the temperatures were determined by means of a thermocouple of platinum and platinum-rhodium.

Both acid and basic bars were subjected to the following heat treatment: (1) heated to a definite temperature and immediately cooled in air; (2) heated to a definite temperature, held constant for two hours and then cooled in air; (3) heated to a definite temperature and cooled in the furnace; (4) heated to a definite temperature, held constant for two hours and cooled in the furnace. The physical tests of the original bars gave the following results: Acid steel—tensile strength, 85,400 pounds per square inch; elastic limit, 43,700 pounds per square inch; elongation in eight inches, 20.3 per cent, and reduction in area, 43.2 per cent; basic steel—tensile strength, 73,500 pounds per square inch; elastic limit, 37,700 pounds per square inch; elongation in eight inches, 25 per cent, and reduction in area, 39.6 per cent.

Results of Tests.

When heated to 900 degrees Cent. and immediately cooled in air, the tensile strength of the acid bar was 81,700 and of the basic bar 74,200 pounds per square inch; when heated to 1,000 degrees Cent., held constant at this temperature for two hours and then cooled in air, the tensile strength of the acid steel was 79,700 and of the basic 68,900 pounds per square inch; when heated to 1,000 degrees Cent. and cooled in the furnace, the tensile strength of the acid steel was 73,100 and of the basic 68,100 pounds per square inch; heated to 1,000 degrees Cent., held at this temperature for two hours and then cooled in the furnace, the tensile strength of the acid steel was 71,200 and of the basic 64,600 pounds per square inch.

While the results obtained are still incomplete, they seem to show the superiority, not only of the steel as originally received from the mill, but also when subjected to varied heat treatments. This difference, however, cannot be accounted for by the carbon, as the analyses were carefully checked and the maximum variation in carbon can hardly exceed 0.03 per cent. The variation in the tensile strength, as developed by these tests, averages from 6,000 to 10,000 pounds per square inch, and whether these differences can be accounted for by the phosphorus and silicon, both of which are higher in the acid than in the basic steel, only more extended investigation will develop.

Strength of Steel From Structural Shapes.

The results of further investigations to determine the strength of steel cut from different parts of the profile of structural shapes, and which have shown some variation in the elastic limit, were reported by Prof. E. L. Hancock of the Worcester Polytechnic Institute. A paper by Prof. Edgar Marburg, of the University of Pennsylvania, read before the society in 1909, contained the results of tests of steel from Bethlehem and standard I-beams. The possible causes for the variation in the proportional limit of steel cut from different parts of the profile of a structural shape were summed up by Prof. Hancock, as follows:

Difference in chemical composition.

Difference in the amount of work done on the material in rolling.

Difference in finishing temperature of the metal in different parts of the profile.

Cold bending of the beams in straightening.

It was pointed out that the variation in the chemical composition of steel cut from the web, root and flange does not seem sufficient to explain the variations in the elastic limits that have been observed. During the present year tests have been made at the Worcester Polytechnic Institute to ascertain if further reasons could be found for the irregularity previously reported and to account, if possible, for the low elastic limit in some cases. For these tests, nine stub ends of structural shapes were selected, as follows: Three standard I-beams, 12, 15 and 18 inches; one Bethlehem beam; three standard channels, four, 12 and 18 inches; one 24-inch Bethlehem beam; three standard channels, four, 12 and 15 inches; one 10-inch Bethlehem H-section and one six-inch angle.

Only three of the structural shapes, in the physical tests gave the relation of web, flange, root. The heavy 15-inch, 60-pound beam showed no variation between the web, root or flange. The channels all gave a higher value for the root and about the same for the flange and web. The angle showed no variation, while the Bethlehem beam section showed the relation of web, root, flange.

Conclusions.

As a result of these exhaustive tests, Prof. Hancock reached the following conclusions:

That the tensile strength, per cent of elongation and per cent of reduction of area are practically not affected by the chemical composition or treatment, during or after rolling; that the yield point is affected but slightly and that the elastic limit is affected, but not seriously, when the proper precautions are taken.

The chemical composition of open-hearth beams is so uniform throughout the beam as to cause no practical difference in the strength of the metal cut from different parts of the profile of the beam.

If all parts of the profile of a beam were finished at the same temperature, it would be expected that the root of the web would have a slightly lower elastic limit than the center of the web or the flange, because of the smaller amount of work done upon it in the rolling. But the flange and web, being thinner, are finished at a slightly lower temperature than the root, and so have their elastic strength increased still more, due to this lower temperature. The web probably received more work than the flange in rolling.

Overstraining structural shapes lowers the elastic limit of the metal, but not permanently, the elastic limit returning to and above its original value when the material is allowed to rest. Cold straightening of beams probably accounts for some low values of the elastic strength obtained by recent investigations. The evidence of recov-

ery should give confidence to the users of these materials.

Detecting Adulterants in Vegetable or Animal Oil.

One of the most valuable discoveries reported to the society at this meeting was a simple and reliable method of detecting the presence of cheap mineral or resin oil in expensive vegetable or animal oil. Owing to the adulteration of linseed oil used as a binder for making cores, Alexander E. Outerbridge Jr., metallurgist of William Sellers & Co., Philadelphia, sought a rapid and reliable method of detecting the presence of mineral oil in linseed, lard or other vegetable and animal oils, which could be used by anyone not skilled in oil analyses.

In the course of his investigation, Mr. Outerbridge discovered that the greenish bloom or fluorescence of mineral oil and the blue bloom of resin oil nottceable in daylight, can be enormously intensified by reflected light from an enclosed electric arc, so commonly used in industrial works by reason of its relative economy. If the plain glass cover of this light fits properly, so that air does not enter as rapidly as it is consumed, the arc burns in a partial vacuum or, at least, the air is rarified and, under these normal conditions, this light shows continuously, after burning a minute, a faint rosy light in addition to the powerful white light. If a vessel containing any mineral oil, crude or refined, or any resin oil, be placed in the path of these rays the most intense fluorescence appears, even in daylight, greenish in the case of mineral oil, blue in the case of resin oil. So strong is this fluorescence that if one cubic centimeter of either mineral oil or resin oil be diffused in a bottle containing 99 cubic centimeters of linseed oil, or any non-fluorescent oil, its presence is plainly seen; and even one cubic centimater of crude mineral oil in 999 cubic centimeters of non-fluorescent oil has been detected.

Core Oils.

The following, from Mr. Outerbridge's paper, treats of core oils for foundry use:

I have found that Soya oil pressed from beans grown in enormous quantities in China and elsewhere, is an excellent substitute for linseed oil for making cores if used in its natural state, without having been compounded or adulterated. It costs about 60 cents per gallon for fine grades. The very best substitute for linseed oil as a binder for oil cores that I have discovered is crude whale oil, costing about the same as Soya oil, the only objection to its use being an unpleasant fishy smell which escapes from the core ovens during the baking of cores. It makes a splendid binder. I am told it is now being deodorized, but I doubt the effectiveness of any such treatment. Cottonseed oil is used for the same purpose, but so much larger proportion of oil to sand is required that there is little economy in its use as compared with the other vegetable oils.

A simple and practical test of the value of core oils is to make a dozen companion test cores 1 x 1 x 15 inches from batches of pure linseed oil and sharp sand, and also from the same proportions of any other oil and sharp sand. These are placed side by side on an iron plate and baked under precisely the same heat conditions. When cold they are broken on a transverse testing machine with supports 12 inches apart. The relation between the average strength of the two sets of test cores is a measure of the binding qualities of the oils.

Hardness Tests.

Practically the entire Thursday afternoon session was devoted to a consideration of hardness tests of metals. R. P. Devries presented two papers entitled, respectively, "Hardness in Its Relation to Other Physical Properties," and "A Comparison of Five Methods of Hardness Measurement." The latter paper was an exhaustive treatise of the various methods of hardness measurement and the comparison of the results obtained by the various methods proved exceedingly interesting. All of the methods of hardness testing were described in detail and the other valuable data contained in this report reflected the careful and extensive investigation made by the author.

Prof. Bradley Stoughton briefly reported the results of a series of four comparative tests of hardness made by the Shore scleroscope and Turner's sclerometer or diamond scratch test, on steel that varied from hard tool to soft steel, and it was found that the readings by the two methods were roughly comparable.

"The Property of Hardness in Metals and Materials" was the subject of a paper prepared by A. F. Shore. He directed attention to the fact that the scleroscope is now made semi-automatic and is capable of giving over 5,000 hardness readings per day. Mr. Shore stated that hardness testing is now universally practiced by the rolling mills, particularly where rolling or drawing is done cold, and is especially applicable to non-ferrous metals.

A portable hardness testing device which can be carried in the pocket was described, and it has been found to be particularly valuable in obtaining hardness measurements on guns, rails in service and on large steel sections generally. Dr. Howe commented favorably on the investigations reported and added that a satisfactory hardness test is very much to be desired, owing to its low cost, to replace the expensive tensile test.

Testing Apparatus and Methods.

A new method of subjecting gear teeth to shock which could be measured was described in a paper submitted by J. S. Macgregor and Prof. Bradley Stoughton. It was contended that the fracture of the teeth of a pinion occurs as a result of a suddenly applied load rather than of a static load, and the test devised gives a measure of the suddenly applied load. The investigation also covered tests of endurance of case-hardened gears.

New types of impact testing machines for determining the fragility of metals and a new type of autographic transverse testing machine for research testing or regular foundry practice, were described by T. Y. Olsen. Proposed standard methods for transverse tests were favorably acted upon and will be submitted to the members for letter ballot.

Testing Boiler Tubes.

F. N. Speller of the National Tube Co., Pittsburg, described a special machine designed for making flange, flattening and crushing down tests on boiler tubes, the crop ends cut off from each end of every tube being tested in this way. The machine is operated by hydraulic power, both vertical and horizontal cylinders being controlled by the same lever. On the subject of specifications for boiler tubes, Mr. Speller made the following suggestions:

Locomotive tubes, whether seamless or lap-welded, must sooner or later, be safe-ended, hence the welding quality of the metal should be one of the first considerations in manufacture. Some specifications restrict the chemical composition in some particulars, so as to hamper the manufacturer in making a good welding steel. There is no difficulty in making steel with a maximum of 0.03 per cent phosphorus if necessary, but there is reason to believe that 0.05 per cent phosphorus is a more reasonable maximum limit which does no harm, and, with other conditions the same, will give a tube better adapted to service and much more easily welded.

Another restriction which experience teaches is operating against the best quality in locomotive tubes is unreasonable sulphur requirements. The highest sulphur allowed in samples taken from individual tubes is, in some cases, 0.035 per cent, which means that the ladle test must not exceed 0.030 per cent. With producer gas this means that the heat must often be held and a heavier burden of lime carried, which tends to render the steel "dry" in welding and more liable to be crystallized or burned. If there is any advantage in a closer sulphur specification than, say 0.05 per cent on samples taken from individual

tubes, we would be glad to learn what is gained thereby from those who have had more experience. Personally, I have not found a case of failure which could be attributed to the sulphur being as high as 0.05 per cent; on the other hand, there are undoubtedly countless numbers of tubes giving good service which carry close to this amount of sulphur.

Analyses of the surface of beads taken from tubes after being in the boiler some time, show that sulphur is absorbed from the hot flue gases, so that if there is any advantage in using steel of 0.03 per cent sulphur, it would appear to be only temporary.

Mr. Speller exhibited a chart of the results of his investigation into the sulphur absorption of locomotive boiler tubes. No consistent relation could be established between the original sulphur and the amount absorbed, and it does not follow because a tube was originally low in sulphur, that it would, therefore, show comparatively low sulphur after being subjected to the action of the hot flue gases. On the subject of welding, it was stated that nine heats of steel which averaged 0.03 per cent or less of sulphur, showed 20 per cent more rejections on account of bad welds than eight heats in which the sulphur averaged over 0.04 per cent.

Coal and Coke Tests.

Some exceedingly interesting data obtained in the operation of a cupola when making tests of foundry coke at the government testing station at Pittsburg, were briefly presented in a progress report made by the committee on standard specifications for coal. In some of the coke tests already made it was found that 52½ per cent of the metal charged in the cupola was oxidized or lost, which was largely due to the nature of the coke used.

International Congress For Testing Materials.

In its annual report, the executive committee announced that the sixth congress of the International Association for Testing Materials will be held in this country during the first half of September, 1912, and an effort will be made to so arrange the date that sectional meetings may be held in common with sectional meetings of the Congress of Applied Chemistry, which will be convened in Washington on Sept. 4, 1912, and will hold meetings in New York from Sept. 6 to 13. The nucleus of the general organizing committee of the congress will consist of members of the executive committee and the officers of the standing technical committees of the American Society for Testing Materials. The executive committee of the organizing committee of the congress consists of the president, vice president and secretary of the American Society for Testing Materials, and the chairmen of the committees of the general committee on organization. The following committees have been created: Finance, papers, transportation, excursions, information, reception, local and ladies' entertainment. The American membership in the International Association is now 473 as against 415 a year ago and outnumbers, for the first time, every other national membership in that organization. Other features of the executive committee's report were published in THE IRON TRADE REVIEW, June 29.

The next annual meeting of the American Society for Testing Materials will be devoted to the consideration of committee reports only and the presentation of papers will be deferred until the international gathering in New York. The executive committee was authorized to make suitable arrangements with the international society for copies of the proceedings of the congress, which will be mailed to each member of the American society, regardless of membership in the international body. Arrangements will also be made for furnishing copies of the proceedings of the congress to the junior members at a price of $2.50 per volume.

Testing the Law.—In the proceedings of the first test case to determine the constitutionality of the industrial insurance of workingmen's compensation act passed by the Wisconsin legislature at this session, a permanent injunction has been issued by the circuit court restraining The Falk Co., of Milwaukee, from placing itself under the provisions of the new law. Otto H. Falk, vice president of The Falk Co., is president of the Merchants & Manufacturers Association of Milwaukee, which is virtually in charge of the test of the act. The issuance of the permanent injunction places the issue directly before the state supreme court, which will probably undertake the case at the August term.

Demand for Calendar. — The demand for the Apollo all-metal perpetual calendar of the American Sheet & Tin Plate Co. has been so heavy that it has become necessary to issue new editions. These have been delivered and the company announces that it will forward one to every dealer, metal worker or user of sheets or tin plate, who will write for one to the general offices of the American Sheet & Tin Plate Co., Pittsburg.

NEW PRESIDENT

Named for U. S. Cast Iron Pipe Co.—Income Declines.

L. R. Lemoine, of New York, formerly vice president in charge of sales of the United States Cast Iron Pipe & Foundry Co., was elected president of the company at the annual stockholders' meeting held at Jersey City, June 28. Mr. Lemoine succeeds as president George B. Hayes, who has been made chairman of the board of directors, a newly-created position. The other officers were re-elected. Colgate Hoyt Jr. was made a director, vice David Giles, deceased.

In its income account for the year ended May 31, 1911, the company shows a falling off of $72,782 in revenue from the preceding year and a decline in its balance after deducting interest on bonds, reserves for improvements and doubtful accounts of $62,-023. The income statement as of May 31, 1911, compares with that of the previous year as follows:

	1911.	1910.
Gross inc. from op.	$536,711	$636,711
Other income	93,798	66,580
Total income	$630,509	$703,291
Less—		
Int. on Amer. P. & F. bds.	90,000	90,000
Net earnings	$540,509	$613,292
Reserved for imp.	44,140	54,900
Doubtful accounts	12,000	12,000
	$484,369	$546,392
Add—		
For add. working capital	250,000	200,000
Undivided profits	35,511	164,120
	$769,880	$910,511
Less—		
Preferred dividends	625,000	875,000
Balance May 31, 1911	$144,880	$ 35,511

Makes Standard as Well as Bethlehem Sections

An announcement, just made, of considerable importance in the structural market is that the Bethlehem Steel Co. is now offering to the trade standard structural shapes as well as its special, wide-flange beam, commonly known as the Bethlehem section, which has been freely specified in building operations in recent years. The company is now rolling on its 28-inch structural mill channels up to and including 15 inches in size, angles up to and including 8 by 8 inches and standard beams up to 10 inches.

The Pawling & Harnischfeger Co., Milwaukee, has amended its articles of incorporation to provide that $480,-100 of its capital of $1,000,000 shall be preferred stock drawing a dividend of 5 per cent annually, the remainder of the stock to be common.

(In order to assist the post office in delivering letters to new concerns, it is suggested that the names of incorporators be written in the lower left hand part of every envelope addressed to such new companies.)

New Buyers

The following manufacturing companies have filed articles of incorporation:

Lafayette Safe & Lock Co., LaFayette, Ind.; $25,000; by George Jenks, Ferdinand Dryfus, I. L. Schultz, S. S. Washburn, Julius Betlovitz.

Automatic Signal & Appliance Co., Cleveland, O.; railway signaling devices; $10,000; by N. G. Coen, H. B. McGraw, M. H. Gallagher, K. I. Saunders and W. C. Saeger.

The Star Engineering Co., Cleveland; general machinery business; $10,000; by Frank Svoboda, Edward Petnek, Herman Zluhan, Cornelius J. Kelly and Henry Spengler.

American Auto Trimming Co., Ltd., Walkerville, Ont.; capital $40,000; provisional directors, Benjamin Gotfredson, Frank H. Joyce, Noble A. Bartlet and others.

The Simplex Novelty Co., Vineland, N. J., $10,000; by Frank Lore, Joseph H. McKillip, and Victor Durand; to manufacture machinery, appliances, castings, tools, etc.

Philadelphia Gear Works, Camden, N. J.; $100,000; by Robert C. Coulter, Russell C. Ball and George D. Connelly; to manufacture gears, gear wheels, screws, bolts, etc.

Death & Watson, Ltd., Toronto; capital $40,000; to manufacture electrical machinery; provisional directors, Norman P. F. Death, Lionel Watson and George G. Wishart.

Toronto Metal Co., Ltd., Toronto; capital $40,000; to engage in tinning and manufacture metals, etc.; provisional directors, Henry Jennings, Gilbert McWilliam and John McWilliam.

Victorsohn Iron Works, Jersey City, N. J.; $5,000; by Morris Victorsohn, Samuel Summer and Louis Summer; to manufacture ornamental and architectural iron work, fire escapes, etc.

The National Foundry Co., Detroit, Mich.; general foundry business; $25,000; by John B. Fleming, Harry A. Crawford, Paul Weadock, Ernest C. Smoots and James W. Martin, all of Detroit.

The Andrews-Bowman Co., Ltd., Toronto; capital $40,000; to manufacture automobiles; provisional directors, Edwin S. Andrews, John W. Bowman, B. C. Bowman and James E. Chamberlin.

Watkins Migraf Co., Manhattan; $50,000; to manufacture testing machines, scientific apparatus of all kinds, etc.; by R. L. Watkins, 20 West Thirty-fourth stret; Robert Willis, 520 Pearl street; G. R. Fall, 76 William street, all of New York City.

The Cornell Construction Co., Cold Springs, Putnam county; manufacture machinery and materials used in construction and engineering work, general contracting; $100,000; by Charles P. Howland, 35 Wall street; L. Vincent Lockwood, 35 Nassau street; Norman B. Beecher, 27 William street, all of New York City.

New Construction

The Massillon Bridge & Structural Co., it is reported in dispatches from Massillon, O., has taken an option on a 17-acre site near that city, upon which it is proposed to construct shops of large size for fabricating material.

General Industrial

The Connor Foundry Co., Grand Rapids, Mich., has been incorporated with $15,000 capital.

The Atlas Special Machine Co., Chicago, has increased its capital stock from $2,000 to $50,000.

Application for a receiver for the Camden Metal Co., Camden, N. J., has been filed. Liabilities are given as $30,000, of which amount $7,500 is secured by a mortgage.

The Star Brass Works Co., Kansas City, Mo., advises that the recently noted fire in its factory was not serious, the loss being confined to stock finished and unfinished.

The plant of the Damascus Nickel Steel Co., Pittsburg, which is equipped for the manufacture of crucible steel in forgings, bars, shapes and tool steel, was sold at public auction, June 22, to Ernest L. Tustin, representing the bond holders of the company.

The Carpenter-Kerlin Gear & Machine Co., maker of cut gears, announces the change of its corporate name to the Carpenter-Tew Gear Co., and the removal of its factory and office to the Bush Terminal buildings, third floor, factory No. 5, Brooklyn. The increase in its business has made necessary enlarging of facilities which will be afforded by the removal and added equipment.

Trade Notes

J. M. Betton, manufacturer of Drucklieb injector sand blast apparatus, will remove about July 10 from 178 Washington street to 14 Park place, New York city.

The Davis-Bournonville Acetylene Development Co. and the National Pneumatic Co. have appointed the Davis-Bournonville Co. their exclusive selling agent for welding and cutting apparatus, as well as having added largely to its working capital and executive ability. The business of the Davis-Bournonville Co. will be divided into the eastern department with offices in its present quarters, 90 West street, New York City, and the western department with offices at 515 Laflin street, Chicago, the present quarters of the Chicago welding department of the National Pneumatic Co.

Fires

A frame structure at the shops of the East Buffalo Iron Works, Buffalo, N. Y., was damaged to the estimated amount of $500 June 19.

The shops of the Lennox Machine Co., Marshalltown, Ia., were seriously damaged June 25, the loss being estimated at $80,000. The fire is believed to have originated in the boiler room.

The plant of the Elizabeth Street Foundry Co., Forty-ninth and Elizabeth streets, Chicago, was badly damaged June 25, the loss being estimated at $8,000. City fire authorities suspect incendiarism, although there were no labor troubles at the foundry.